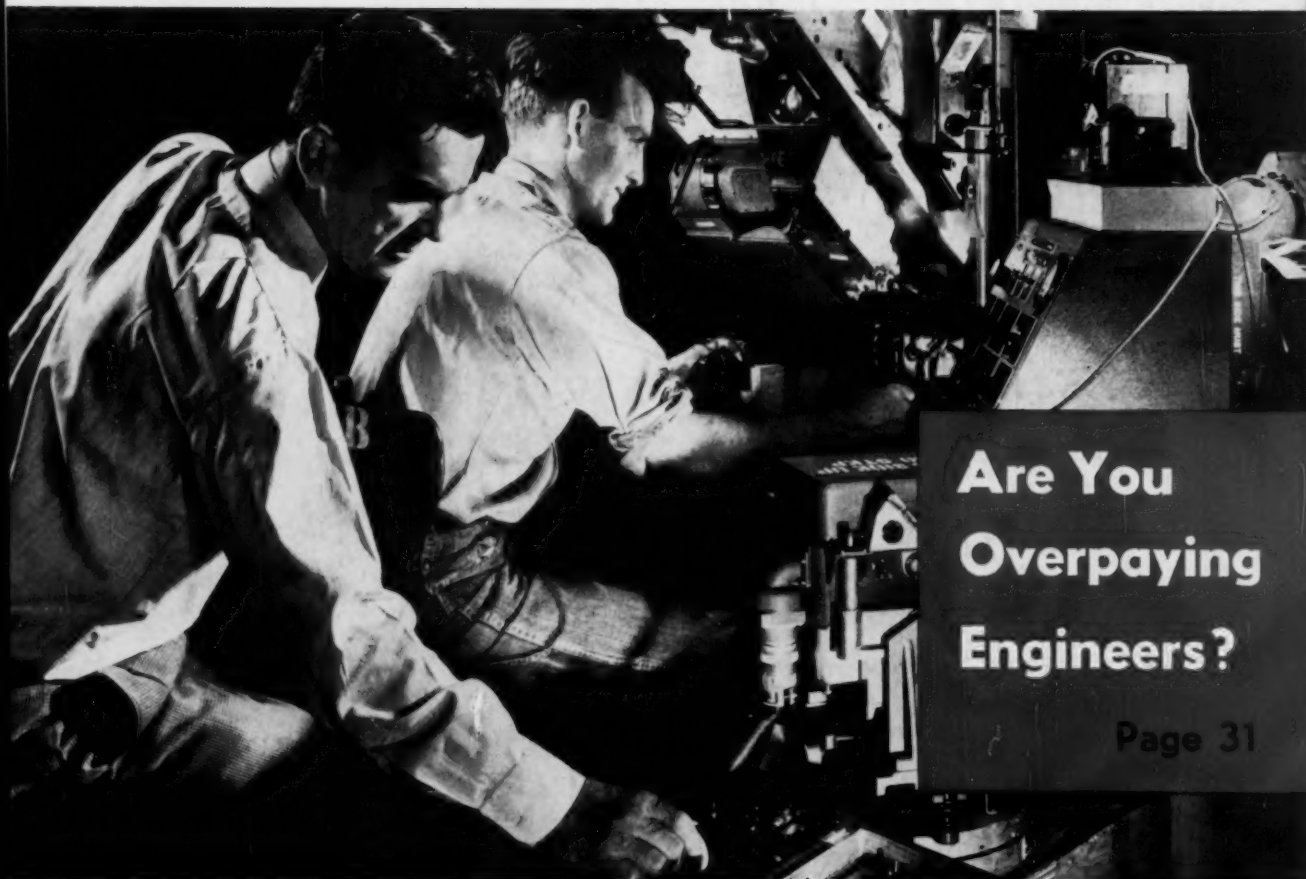


January 12, 1956

The IRON AGE

The National Metalworking Weekly



**Are You
Overpaying
Engineers?**

Page 31

**State of Union:
Your Stake
In Ike's Program**

P-37

Is Pentagon squeezing small business? 53
Electronic brains invade the shop 34
Are we fair to our military leaders? 7
Aluminizing 4000 parts per hour 74

Digest of the Week—Page 2

**NEW WHITING HEAVY-DUTY
TRACKMOBILE BOOSTS PRODUCTION**

Now...get faster, lower cost freight car switching! Speed up car movements in your yard and plant with the new Heavy-Duty Trackmobile. Expedite loading and unloading operations...add new efficiency to traffic handling...give new impetus to higher production.

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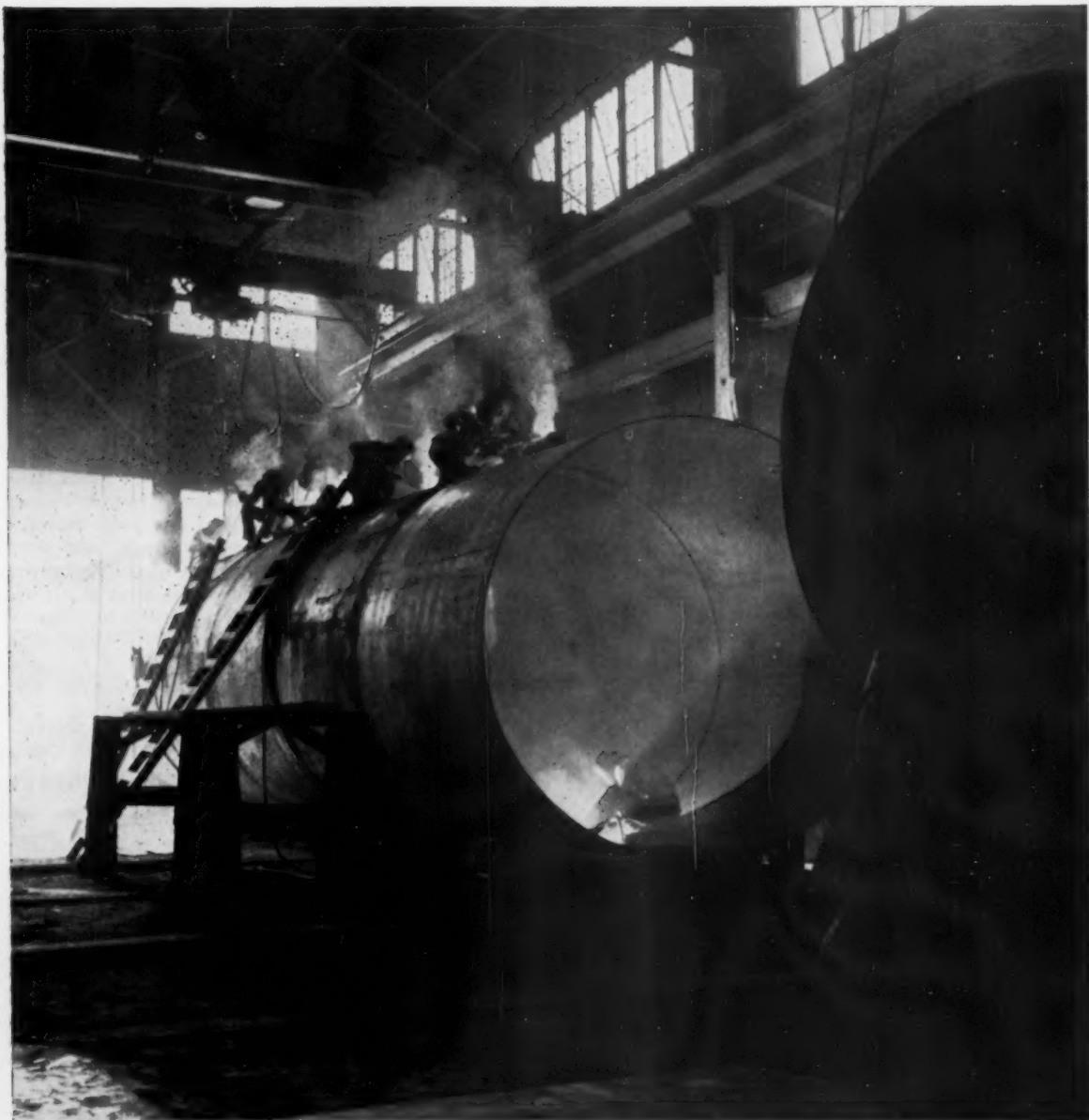


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January 12, 1956

January 12, 1956—Vol. 177, No. 2

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Copyright 1956, by Chilton Co. (Inc.)

THE IRON AGE, published every Thursday by CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1932, at the Post Office at Philadelphia under the act of March 3, 1879. Price to the metalworking industries only, or to people actively engaged therein, \$5 for 1 year, \$8 for 2 years in the United States, its territories and Canada. All others \$15 for 1 year; other Western Hemisphere countries, \$15; other Foreign Countries, \$25 per year. Single copies, 50¢. Annual Review Issue, \$2.00. Cables: "Ironage." N. Y.

Address mail to The IRON AGE
 Chestnut and 56th Sts. Philadelphia 39, Pa.

NEWS DEVELOPMENTS**ARE YOU OVERPAYING
YOUR ENGINEERS?**

—P. 31

Using engineers for non-engineering functions wastes money and training. Many companies are getting more mileage out of engineers by substituting technicians in routine or general jobs. Production scheduling, quality control, testing, and the routine phases of design are being taken over by technical institute graduates, production workers and others.

**STEEL INDUSTRY FACES
A CRITICAL YEAR**

—P. 35

This is a make-or-break year for steel. Sales will be no problem but handling of price, customer relations and expansion problems will determine futures of steel companies.

PRESIDENT CAUTIONS**AGAINST TAX OPTIMISM**

—P. 37

State of the Union message places budget balance ahead of tax cuts. Administration wants minimum wage law extended. Plan high levels of defense spending, foreign aid.

**INDUSTRIAL MOVIES CAN
BE INEXPENSIVE**

—P. 38

The coming of age of the magnetic sound-track puts a program of good industrial movies within the reach of every metal-working company, for sales promotion, safety instruction, employee training and prestige.

**AIR FORCE PUSHES
INDUSTRIAL READINESS**

—P. 40

New Air Force policy statement says the next war will not permit a gradual industrial buildup. Air Force is ear-marking the defense materials that are most critical. Production of these will be stepped up immediately if general attack comes.

THE IRON AGE

Jan. 12, 1956



ENGINEERS make settings in final calibration of rocket sights. New thinking on proper role of engineers has technicians handling routine jobs. Story—P. 31. (Photo by Robt. Yarnall Ritchie Productions, Inc.)

WHAT'S BEING DONE ABOUT LOWER CARS? —P. 48

Engineers accept lower design as inevitable. Smaller wheels, revised drive lines provide part of answer. Final result may be front-wheel drive or rear engine. Next year's models will be lowest ever as styling sections dictate low silhouette as what public demand is bringing.

FEATURE ARTICLES

CERAMIC BRAZING JIGS RAISE OUTPUT —P. 71

Ceramic jigs have helped cut costs, boost production on both small and large operations. They are remarkably stable thermally, permit assembly tolerances down to ± 0.005 in. without jamming, buckling, warping. Brazing time with the jigs has been cut as much as 75 pct.

ALUMINIZING CURBS HIGH HEAT EROSION —P. 74

Cost conscious designers sometimes hit a stone wall when product improvement hinges on using more expensive base metal. Option of coating with a nobler metal often is unattractive costwise. Spray metallizing offers advantages. A two-cycle induction heating setup allows automotive engine valves to be aluminum sprayed automatically, at a rate of 4000 parts hourly.

CONFERENCE METHOD SPARKS SAFETY PROGRAM —P. 78

Effective safety training programs take more than mechanical safeguards, special committees, penalties and periodic lecturing at employees. They take active employee interest and cooperation. The conference technique helps. Proved out in a number of plants, it encourages participation down the line.

CAN CASTERS MEET GAS TURBINE NEEDS? —P. 80

Precision casting may play a prominent role in the automotive gas turbine of 1960. But many conditional "ifs" qualify the extent of that role. Initial reports from Detroit speak of general satisfaction with casting as a production method for many gas turbine parts.

COMPUTER FINDS GRIND WHEEL FORMULAS —P. 84

Day of computer-controlled production may not be too far off. Already punched cards representing customer orders are integrated and coordinated by computing equipment. Orders from field arrive on perforated tape, are fed into machine which calculates correct formulation and raw materials necessary; specifies manufacturing instructions, schedules delivery dates.

MARKETS AND PRICES

ELECTRONIC BRAINS MOVE INTO THE FACTORY —P. 34

IBM sales of electronic calculators came to about \$500 million last year. Other producers are also doing well as electronic brains figure costs, calculate strains, analyze sales.

WHY BOOM LEAVES SCRAP PEOPLE TROUBLED —P. 36

Scrap prices are at all-time peaks. Demand is strong, promises to stay that way. But scrap men, meeting in Chicago, express fears that price resistance or a steel strike might scramble today's bright picture.

CONGRESS BLASTS PENTAGON ON PROCUREMENT —P. 53

Defense Dept. is under fire for letting too many contracts by direct negotiation, not enough by open bidding. Waste and unfairness are charged. Pentagon is told to broaden supply structure.

MACHINE TOOL SALES CONTINUE TO CLIMB —P. 59

November machine tool orders show this month was even better than a very hot October. Sustained spurt has builders wondering if a new sales pattern has been established. Shipments continue to lag, adding to big backlogs and raising the question of how long buyers will wait.

AUTOS BIG QUESTION IN STEEL OUTLOOK P. 111

Will the cutbacks in auto production be big enough to ease the pressure on steel? Apparently, there's been little or no effect as yet. In fact, some automakers are diverting steel to other divisions, including appliances, with the result that their steel intake has not been cut greatly.

NEXT WEEK:

WHERE ARE THE INCENTIVES FOR DISPERSAL?

Heavy concentrations leave U. S. industry open to damaging attack. All authorities agree dispersal is needed. But is anything being done to produce real dispersal? Next week's story goes into the whole question, covering the need and the means, presenting some startling facts on dispersal.

HOW CONTRACT STAMPERS CHOOSE PRESSES

Customers nag the job shop stamper around the clock. And they gage his value as a supplier by his speed of response to sudden demands. Just what kind of equipment is needed to run a contract stamping plant efficiently? Here's how one shop operator evaluates the many factors involved.



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and can easily operate at the high temperatures required for desulphurizing. Controlled stirring of the molten metal speeds up recarburizing rate and solution of alloy ingredients. The photograph shows a Junker coreless induction furnace for melting and superheating cast iron in a German foundry.

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The BRIDGE that took 5,000 YEARS to build...

Although bridges are almost as old as man and iron in one form or another has been in use for 5000 years, it was not until 1867 that man ventured to build anything so daring as the Eads Bridge across the Mississippi River at St. Louis. And no wonder that the engineers were eager and ready for a new material called alloy steel, because American railway bridges were falling down at the rate of twenty-five a year with the loss of much property and many lives.

So James Buchanan Eads, famed as raiser of sunken steamers and a maker of ironclad steamers for the Civil War, used alloy steel for the first time as a structural member. The Chrome Steel Company of Brooklyn submitted to him samples of steel made by the crucible process containing 0.5 per cent chromium, and was awarded the contract.

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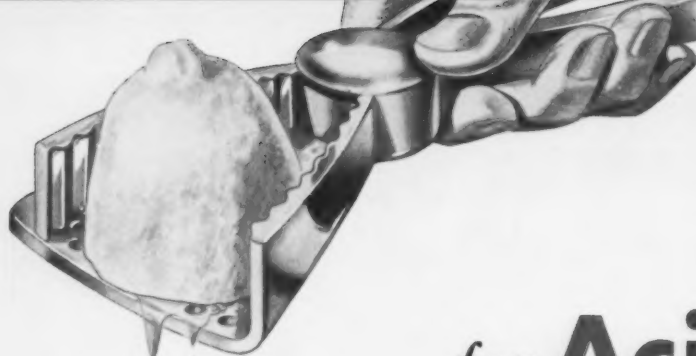
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January 12, 1956

EDITORIAL

Are We Unfair To Our Military?

♦ WE AS AMERICANS blow hot and cold. Hardly ever do we strike a nice balance. Usually this doesn't hurt us too much. But sometimes it does. Even then we are slow to admit it.

For almost three years we have been tough on our military people. The morale of the armed forces has been declining steadily.

You can't fight a war—hot or cold—with Univacs alone. You can't expect officers and enlisted men to feel deeply the need for patriotism and service in the midst of a cold, cut and dried atmosphere almost completely dominated by civilians. You can't have a spirit of sacrifice with accountants and efficiency experts breathing down your neck—all of the time.

The exodus of trained personnel from the services after costly training is something that should frighten us. We can't stop this trend by adding another assistant secretary of defense.

The longing looks which some top level officers aim toward their retirement is not healthy. And the speed with which they join industry is not the best testimonial for choosing the services as a career.

Military people who live for their country do not engage in public debate unless the principle and the stakes for freedom are great. Such a disciplined attitude covers up the long steady accumulation of frustrations shouldered by military people.

You can do something about this. As businessmen, through your organizations, friends, and other groups you can call for better morale and a changed attitude toward the military. This is not a passing fancy. It is known that many top level military people are upset over the treatment accorded the services at various times in the past few years.

Furthermore, we have placed a terrible burden upon President Eisenhower because he is an outstanding military leader. We expect him to settle the "disagreements" between the civilians in the Pentagon and those whose whole life and training are tied up with the security of our country.

No one expects the military to run our country. But in making sure they don't, it isn't necessary to degrade the services.

Tom Campbell

EDITOR-IN-CHIEF

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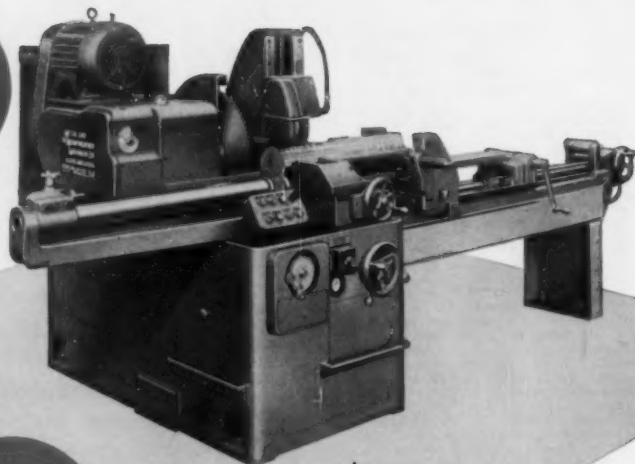


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Triple-threat

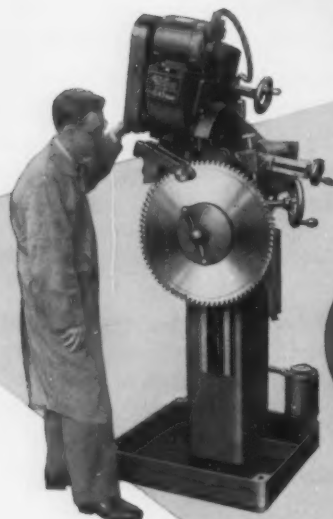
TO HIGH CUTTING COSTS

CIRCULAR
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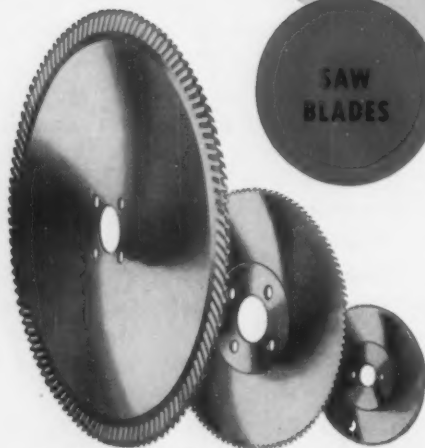
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dear editor:

letters from readers

Industrial Medicine

Sir:

You will recall the letter of protest of Dr. Leonard Goldwater which you published in your December 15 issue.

As I understand it, Dr. Goldwater's protest was based on an accidental misinterpretation of the statement of the function of the Occupational Health Institute in an article in your magazine. Those of us who are interested in the best interests of industrial medicine and its future in this country fully intend to clear up any misapprehension that either Dr. Goldwater or his academy may have about the Occupational Health Institute.

The Occupational Health Institute, which formerly was known as the American Foundation of Occupational Health, has been supported for several years by many segments of industry, especially by the iron and steel industry. The Committee on Industrial Health of the American Iron and Steel Institute, of which I am ex-chairman and presently a member, has been interested and has been kept informed of the activities of the Occupational Health Institute over the years. As far as I know, there is no dissatisfaction on the part of the Iron and Steel Institute Committee concerning the activities or the objectives of the Occupational Health Institute.

The Occupational Health Institute is sponsored and to a large extent controlled by the Board of Directors of the Industrial Medical Association which represents close to 3,000 industrial physicians in this country who are interested in the broad over-all aspects of industrial medicine and whose interests are not limited to the particular problems of strictly full-time medical directors.

Many of us in the Industrial Medical Association, on the Com-

mittee of the American Iron and Steel Institute and in the Occupational Health Institute have enjoyed very good and friendly relations with representatives of your important magazine and many other trade journals of equivalent status, and we certainly want to continue this relationship. *E. H. Carleton, M.D., Past President, Industrial Medical Association, Member, Board of Directors, Occupational Health Institute.*

Metal Powder

Sir:

I have just finished reading the article "Metal Powders: Bullets To Bearings" in your December 8 issue and the inaccuracies appearing therein are very disturbing. I must admit that the basic information used in the preparation of the article was given your editor by us in the form of a paper entitled "Some Statistical Aspects of the Metal Powder Industry," a copy of which is enclosed. However, it is obvious that your report deviates considerably from our paper.

For example, the last paragraph in your article indicates the shipments of solder powder at 1,000 tons a month. The information given your editor was 1,000 tons a year as indicated in our paper.

Also, the chart illustrating your article indicates Metal Powder Shipments. The chart supplied your editor was for iron powder alone and does not include any other metal powders.

Also, in your sub-head is included the statement: "Big Use Of Lead Powder Is In Bullets."

This statement was true in 1945 but is certainly not true in 1955. Lead powder has an important classified military application today entirely different from the frangible bullets used in 1945. *R. L. Ziegfeld, Secretary-Treasurer, Metal Powder Association, New York 17, N. Y.*

TO MAKE IT SELL FASTER...



consider
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Again and again, the buying public has demonstrated—with cash on the line—that it has a strong and ready preference for any product that features one or more balls in its mechanism. Ball-point pens, for example...

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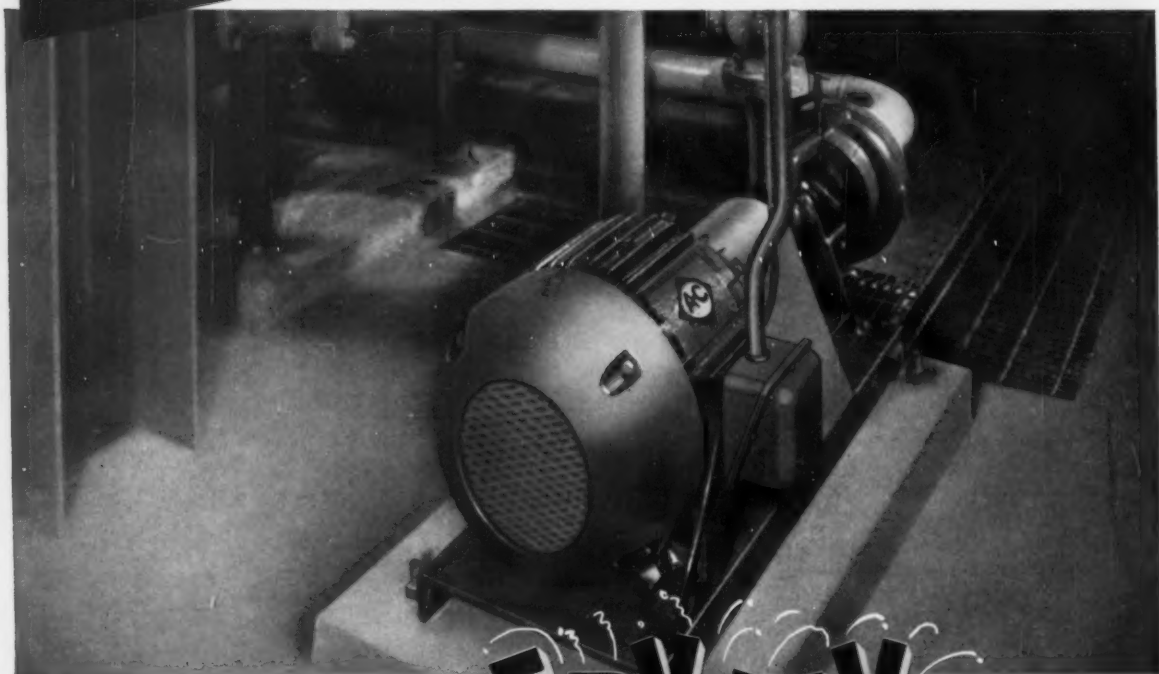
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fatigue cracks

Our First Batch

If we sound a little groggy today it's because we stood the 2 to 4 watch out in the still room this morning. Ya' see Shoes and I ran off a batch last night, and not ever having had the corn or an old farm or Shoes before it was *our first batch* and that's like having your first baby. Ya' feel so proud. Maybe we better start at the beginning.

It's like this, see. We moved to Philadelphia and contracted for a house to be built so we could live in a house, but it was early apparent that the builder's pre-money promises were much better than his post-money performance so we were forced to obtain temporary barracks and with three children, a dog and a wife the only people who had the guts to take us in was Shoes, formerly main propulsion officer on the Wasp, who had retired and settled on a lovely old farm half way to Harrisburg and that's where we are now located probably permanently. (Won't give exact address for the obvious.)

Old Shoes, being real handy with machines and tools and we being real handy in other directions, it didn't take us more than a couple of minutes to realize that this was an ideal place to turn out some real stuff. So we've been busy as little beavers. If you're interested, here's the ingredients we found were essential. If you're not, there's a swell article on ceramic brazing jigs on P. 71. Ingredients needed:

1. Corn crib on adjoining farm, accessible for moonlight requisitioning.

2. 25 lbs of sugar (can put on wife's food allowance), best to buy at Farmer's Market as they're used to such purchases in bulk.

3. A wife who thinks you're just making some little old home brew.

4. Another wife (for Shoes)

by William M. Coffey

who thinks you're just making some little old blackberry wine.

5. A warm basement w/blower arrangement.

6. An outhouse w/running water.

7. A \$9 Coleman or equivalent stove.

8. A barrel, 50-gal, best if wood and charcoal seasoned.

9. A 5 gal milk pail (take out all milk).

10. 5 cakes of yeast.

11. An air-tight lid for 5-gal milk pail (lid from wife's pressure cooker is ideal, has safety valve).

12. A little daughter who can keep her mouth shut about pressure cooker lid.

13. Coils.

14. 10 gal water.

15. Shotgun w/watchdog.

16. Ambition.

Ya' take all that stuff and mix it together, let it work in the warm basement until it's through working, then take it to the still house and cook it, and drip by drip, small stream by small stream ya' got yourself half a gallon. Really good stuff.

Funny thing, though, when we got back into the house, the lights wouldn't work. Must have been a fuse. Our first batch. *Gosh.*

Puzzlers

We pay tribute today to Charlsie and the Bunch at General Steel Castings, for the wonderful Christmas present they sent us. The Bunch sent us a beautiful leather-bound, gold-inscribed portfolio containing all our puzzlers and answers back to 1953. This was real nice, honest. And what's the matter with the rest of you?

Washington Bulletin

Just had word that Neil Regeimbal, of the Washington bureau, beat the deadline with a new boy, born 11:50 p.m., Dec. 31. It pays to be a tax expert.

A MARK to Remember



For over three quarters of a century, the Seymour trade mark has been a symbol for the finest quality NICKEL SILVER — PHOSPHOR BRONZE — BRASS — NICKEL ANODES — BRIGHT NICKEL PROCESSES — WELDING RODS and other non-ferrous products.

It has also been a symbol for Seymour SERVICES — speedy, same-day acknowledgment of orders and inquiries — expert engineering and metallurgical help in selecting and specifying non-ferrous metals for special applications.

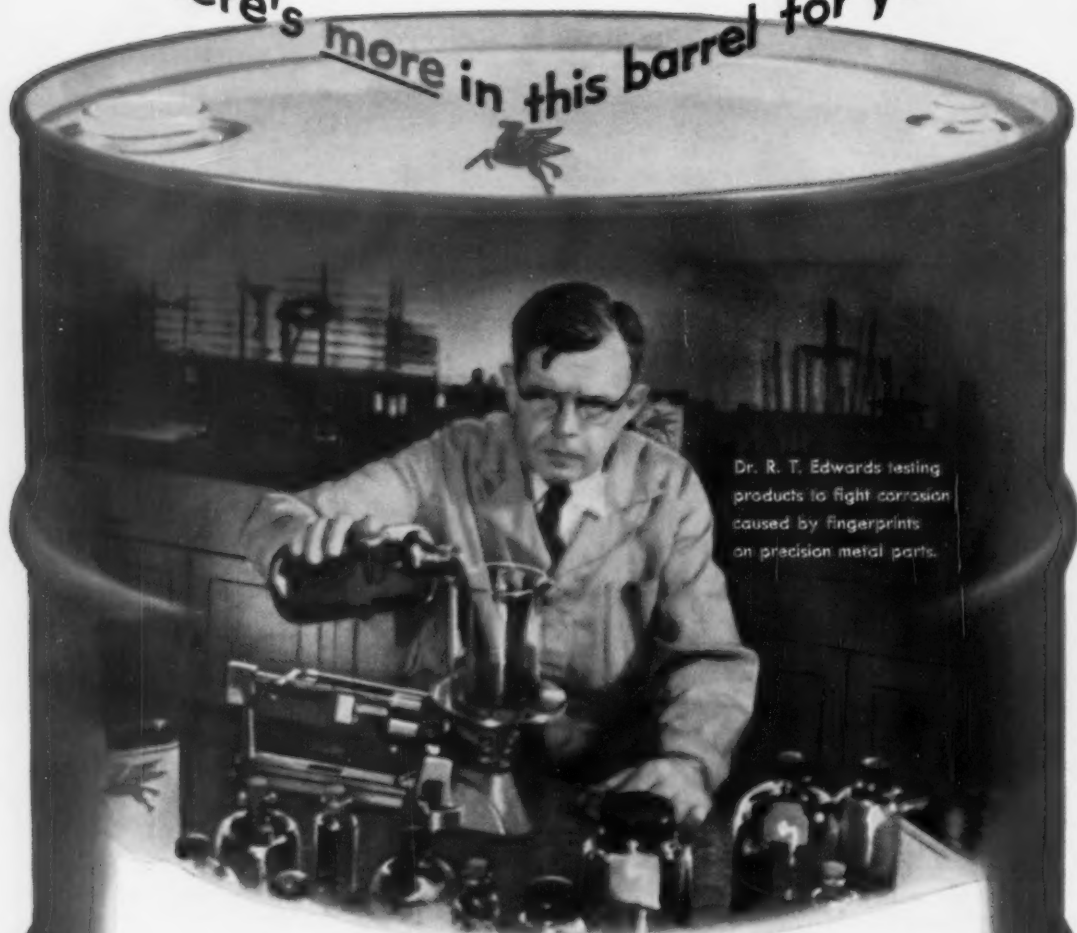
Fine, dependable products and fast, friendly service... these are the qualities which have made the Seymour sunburst a trade mark to remember.

In the months ahead you will see and hear a lot more about Seymour and the products it manufactures. The news will come from Seymour distributors and Seymour representatives.

Watch for it. Listen for it.
MARK IT WELL!

THE SEYMOUR MFG. CO.
500 FRANKLIN STREET
SEYMOUR, CONN.
NEW YORK SALES OFFICE:
CHANIN BUILDING — CABLE, SEYMOURCO

There's more in this barrel for you...



Dr. R. T. Edwards testing products to fight corrosion caused by fingerprints on precision metal parts.

MORE CONTINUOUS RESEARCH to help you improve production and cut costs!

When you specify "Socony Mobil," you get petroleum products backed by *more continuous research* than those of any other oil company! This means products which are *continually improved* in quality and performance—*new* products when needed. Equally important . . . these complete research facilities are available to *you*—to help improve your production and lower your unit costs.

Socony Mobil products are also backed by *more* field engineers serving industry . . . *more* services for analyzing petroleum products in use . . . *more* on-the-job training of your personnel in correct product application . . . *more* approvals from machine builders . . . *more* practical experience—90 years!

Always specify Socony Mobil. There's *more* in every barrel for you!

SPECIFY
SOCONY MOBIL



FIRST STEP
IN CUTTING COSTS

SOCONY MOBIL OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY
GENERAL PETROLEUM CORPORATION

LUBRICANTS • FUELS • CUTTING FLUIDS • WAXES • SOLVENTS • PLASTICIZERS • PETROCHEMICALS

dates to remember

JANUARY

STEEL SHIPPING CONTAINER INSTITUTE, INC.—Winter meeting, Jan. 18-19, Hampshire House, New York City. Society headquarters, 600 Fifth Ave., New York City.

MALLEABLE FOUNDER'S SOCIETY—Semi-annual meeting, Jan. 20, Hotel Cleveland, Cleveland. Society headquarters, 1800 Union Commerce Bldg., Cleveland.

EXPOSITIONS 1956

ASTE—Industrial exposition, March 19-23, Chicago.

MATERIALS HANDLING SHOW, June 5-8, Cleveland.

COMPRESSED GAS ASSN., INC.—Annual meeting, Jan. 23-24, The Waldorf-Astoria, New York. Society headquarters, 11 W. 42nd St., New York.

INDUSTRIAL HEATING EQUIPMENT ASSN., INC.—Annual meeting, Jan. 23-24, LaSalle Hotel, Chicago. Assn. headquarters, 155 E. 44th St., New York.

TRUCK-TRAILER MANUFACTURERS ASSN.—15th annual convention, Jan. 23-25, Edgewater Gulf Hotel, Edgewater Park, Miss. Assn. headquarters, 1042 National Press Bldg., Washington, D. C.

PLANT MAINTENANCE & ENGINEERING SHOW—7th annual conference, Jan. 23-26, Convention Hall, Philadelphia. Society headquarters, Clapp & Pollock, Inc., 341 Madison Ave., New York.

NATIONAL RURAL ELECTRICAL CO-OPERATIVE ASSN.—14th annual meeting, Jan. 23-26, St. Louis, Mo. Assn. headquarters, 155 E. 44th St., New York City.

AMERICAN STANDARDS ASSN.—Gallard Seminar on industrial standardization, Jan. 23-27, New York City. Assn. headquarters, 70 E. 45th St., New York.

AMERICAN MANAGEMENT ASSOCIATION—General management conference, Jan. 24-27, Fairmont Hotel, San Francisco. Society headquarters, 1515 Broadway, New York 36, N. Y.

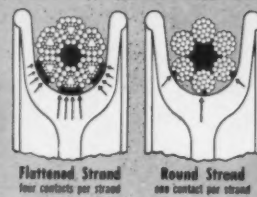
ENGINEERS JOINT COUNCIL—Second annual general assembly, Jan. 26-27, Hotel Statler, New York City. Society headquarters, 39 W. 39th St., New York.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Winter general meeting, Jan. 30-Feb. 3, Hotel Statler, New York. Society headquarters, 36 W. 46th Street, New York City.

FEBRUARY

NATIONAL INDUSTRIAL ELECTRIC HEATING CONFERENCE—Annual meeting, Feb. 6-10, Netherland Plaza Hotel, Cincinnati, O. Society headquarters, 420 Lexington Ave., New York.

PRIVATE TRUCK COUNCIL OF AMERICA, INC.—17th annual convention, Feb. 9-10, Cleveland Hotel, Cleveland. Society headquarters, Sheraton Bldg., Washington 5, D. C.



How to handle the tough jobs with Hercules Flattened Strand wire rope

When you think you need a super-rope, check Hercules Flattened Strand. This is the wire rope that packs in 10% more steel than round strand rope, making it 10% stronger and safer. It wears longer and more evenly—reduces sheave wear, too.

The 10% extra strength over round strand rope is sometimes the difference between the possible and the impossible. Hercules Flattened Strand frequently does the tough jobs which would otherwise require larger size rope—and without the bother and expense of changing sheaves and drums. The extra strength is useful, too, when shock loading is involved. Saves rope—and money.

If you think that Hercules Flattened Strand wire rope may solve a problem, talk it over first with your Leschen man. He can be reached through your nearby Leschen distributor. His advice is based on the best possible authority—Leschen's long experience and engineering research—the longest in the industry. And with Leschen wire rope you are assured of higher-than-rated quality.

If you can use Hercules Flattened Strand rope you'll be money ahead. See about it soon.

Depend on Leschen's higher-than-rated quality.

LESCHEN WIRE ROPE DIVISION

H. K. PORTER COMPANY, INC.

St. Louis 12, Missouri



CF&I-WICKWIRE MAKES WIRE



THE RIGHT SLANT. Her fashionable hat keeps its perky tilt, thanks to CF&I-Wickwire Hat Wire in the brim.



"NEITHER SNOW..." When the going's rough, drivers are thankful for tough, strong tire chains made of CF&I-Wickwire Chain Wire.

*from holding smart hats in shape...
to holding cars and trucks on snowy roads,
nothing does the job like wire!*

The dramatic variety of jobs that wire can fill—almost infinite in number—is encountered every day in hundreds of diversified industries. Shown here are only a few of the countless uses to which wire can be put.

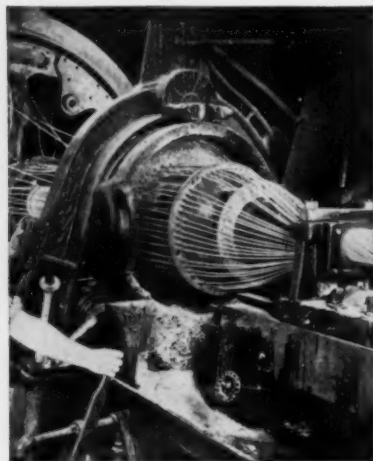
Wire, hair-thin to rod-thick, can be supplied with properties engineered to meet practically any need you may have for it. And CF&I-Wickwire Wire, with a century and a quarter of experience behind it, is ready to serve

you by answering all your wire requirements.

Whatever you assemble, manufacture, or process, check into all the advantages you would gain by using CF&I-Wickwire Wire. You'll like doing business with CF&I-WICKWIRE, and the careful attention given your own particular requirements.

CF&I-Wickwire Wire is made in plants conveniently located from coast to coast. For detailed information, write our nearest district sales office.

ALL WOUND UP. Here a submarine cable is being sheathed in CF&I-Wickwire Armor Wire for protection and resistance to mechanical failure.



DROPPING A MOUNTAIN with dynamite is accomplished with CF&I-Wickwire Fuse Wire for detonators.



SPEEDING AMERICA'S RECORD HOUSING PROGRAM. Stapling insulation to walls saves days of construction time and cuts building costs. CF&I-Wickwire Stapling Wire is used for all kinds and sizes of staples.



IT'S CHILD'S PLAY to open today's sardine tins. Their sturdy key openers are made of CF&I-Wickwire Can Key Wire.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver
El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia



How Dodge Manufacturing Corporation designs pillow blocks that pack more capacity in less space

THESE design features make Dodge-Timken pillow blocks ideal for use where big load capacity in small space is needed: (1) All-steel construction gives extra strength. (2) No space-consuming special thrust devices are needed, because the Timken® tapered roller bearings used take *both* radial and thrust loads in any combination. (3) Timken bearings have high load capacity because of their *full line contact* between rollers and races.

The Dodge-Timken pillow blocks shown below support all head, tail and take-up pulleys on this conveyor

belt which transports ore from ships to railroad cars. Timken bearings take the shock loads because all rollers and races are made of case-carburized steel, with tough, impact-resistant cores under hard, wear-resistant surfaces.

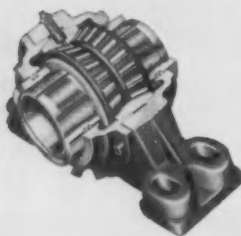
The Dodge-Timken All-Steel pillow blocks on this conveyor utilize a special new type of Timken heavy-duty, self-aligning tapered-bore roller bearing. The pillow block is one of many expansion and non-expansion types made by Dodge Manufacturing Corporation for general power transmission and machine applications;

such as Type E, Double-Interlock, Type C and Special-Duty blocks. All are factory-sealed against abrasive dust and dirt.

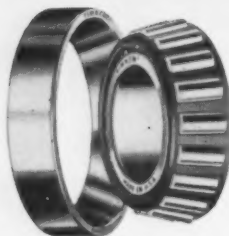
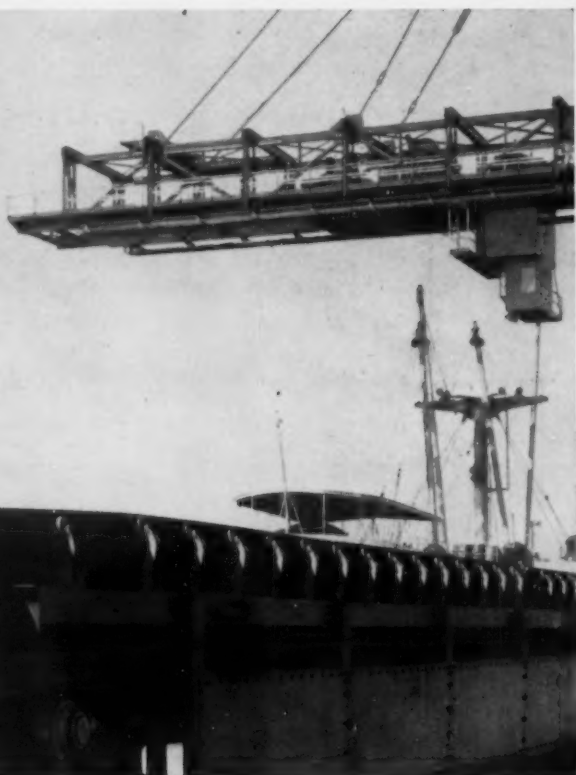
Be sure you get all the advantages of Timken bearings when you buy or build pillow blocks, or any equipment. The Timken Company is America's only bearing manufacturer who makes its own steel. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



CUTAWAY VIEW OF ALL-STEEL DODGE-TIMKEN PILLOW BLOCK shows new Timken heavy-duty tapered-bore roller bearing.



TIMKEN
TRADE-MARK REG. U.S. PAT. OFF.
TAPERED ROLLER BEARINGS



DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roller ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION



GRUELING DEMOLITION CONTEST FAILS TO FLAKE TI-CO!



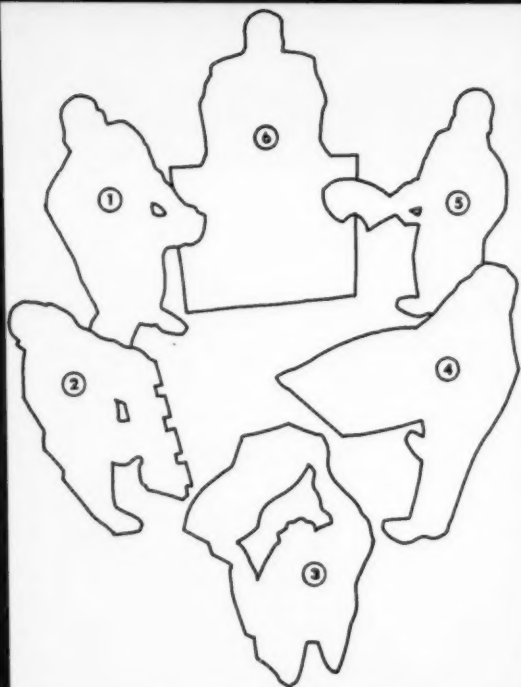
STOCK CAR DRIVER inspects sheet of Ti-Co after battering in demolition race. No trace of coating failure could be found.

The brutal "demolition race" is one of the top crowd-pleasers in stock car racing. Each driver is bent on smashing his opponents out of the race . . . last car still moving is the winner! This grueling automotive mayhem at Chicago's Soldier Field provided the setting for an unusual demonstration of the toughness of the zinc coating on Inland Ti-Co galvanized sheets. A sheet of Ti-Co was lashed to the rear of one of the doomed jalopies. Car after car rammed it head-on, at speeds up to 50 m.p.h. After half an hour of constant

crashing, battering punishment, the car was finally ready for the junk heap . . . but the zinc coating on the Ti-Co sheet had stayed put! Closest examination revealed not a trace of coating failure anywhere.

This test is, to be sure, rather unusual . . . but the Ti-Co coating has survived even tougher tests without cracking, flaking or peeling. Turn the page for more facts about how Ti-Co can cut your manufacturing costs, improve your products and add greatly to their useful life.





Shown (at the left) are six typical severe forming jobs now being accomplished with Inland Ti-Co: (1) deep-drawing, (2) roll-forming, (3) Pittsburgh lock-seaming, (4) spin-drawing, (5) crimping, (6) perforating.

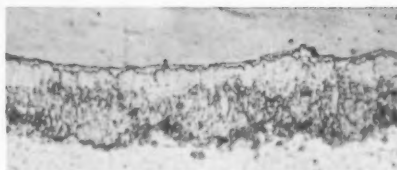
INLAND TI-CO GALVANIZED SHEETS TAKE THE TOUGHEST FORMING OPERATIONS IN STRIDE

Any product that can be formed with steel can be formed with Inland Ti-Co. Ti-Co's ability to withstand even the most severe forming without cracking of the zinc coating makes possible many new galvanized steel products.

The zinc coating on Ti-Co is not only extremely tough but has just enough pliability to actually flow with the base metal as it's formed. Both on the production line and in extended usage, the Ti-Co coating has proved its ability to withstand punishment without leaving the slightest opening for rust to get a foothold. Unlike the conventional galvanized, products made from Ti-Co do not require re-dipping or "touch-ups" after fabricating, and rejects are greatly minimized. Ti-Co products can be depended upon for long service.

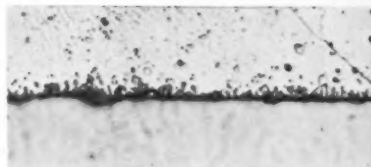
THE SECRET OF INLAND'S NON-FLAKING TI-CO

Inland Ti-Co galvanized steel is made by the patented Sendzimir process, a continuous operation in which the heat treatment of the strip and the application of the zinc coating are performed in one continuous galvanizing line. This process eliminates the brittle iron-zinc alloy layer, that causes flaking in conventional galvanized sheets, and results in production of a sheet on which the zinc adheres so tightly that it can be severely formed without flaking of the coating.



Photomicrograph reveals hard, brittle iron-zinc alloy layers which cause flaking in conventional galvanized steel.

Alloy layers are virtually eliminated in galvanized sheets made by the Ti-Co continuous process of galvanizing.



WHY YOU CAN BE SURE OF TI-CO'S QUALITY

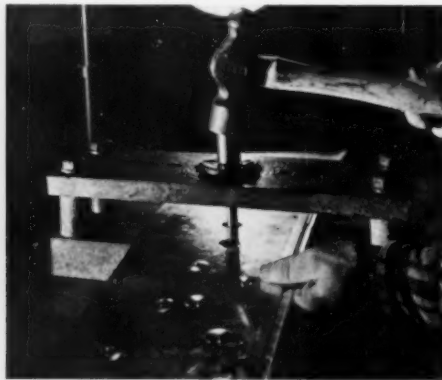
Samples from every order of Ti-Co are put through a series of tests far more severe than ever demanded of a galvanized sheet in normal fabrication.

In addition to the coating tests shown below, the Ti-Co quality control routine includes the following tests: Olson Cup test for ductility; Rockwell Hardness test; Weight for Coating test for uniformity; Fluting test of resistance to cross-breaking; Microstructure test for tightness of coating.

HOW YOU CAN TEST TI-CO. Take a piece of the galvanized steel you are now using and bend it back and forward on itself several times. If the coating flakes or peels, it's *not* Ti-Co. For a free sample of Ti-Co to use in making your own "bend test" comparison, please write to Department 297.



LOCK SEAM TEST. The tough 180° bend of a Pittsburgh lock seam is a supreme test of fabricating qualities. Ti-Co takes it!



IMPACT TEST. Rounded punch hammered into Ti-Co sheet dents the steel. But the Ti-Co coating "gives" without cracking.



BEND TEST. Hammered flat to a 180° bend, the Ti-Co coating shows no sign of cracking or flaking after repeated pounding.

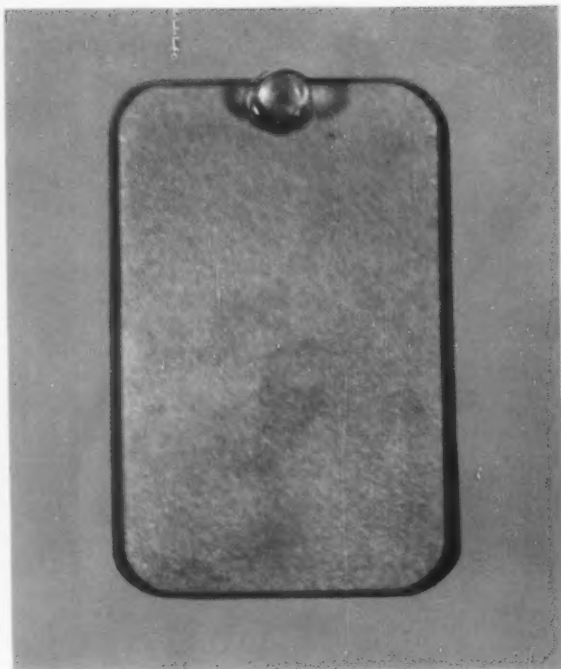
INLAND STEEL COMPANY

38 South Dearborn Street • Chicago 3, Illinois
Sales Offices: Chicago • Milwaukee • St. Paul • Davenport
St. Louis • Kansas City • Indianapolis • Detroit • New York





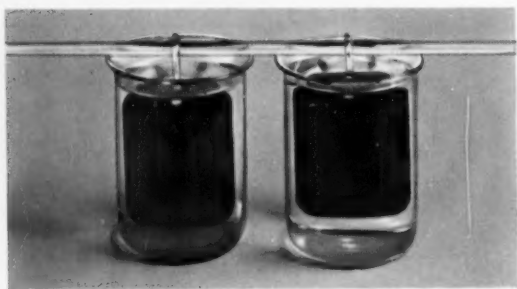
Efficiency of New Sun Rust-Preventive Grease is shown by accelerated test. Rusty test plate (left) was coated with ordinary grease. The large amount of



rust was formed during a 48 hour immersion in synthetic sea water. Plate (right) protected by new Sun rust-preventive grease is wholly rust free after 48 hours.

NEW GREASES PREVENT HARMFUL RUST

**Sun rust-preventive greases give improved lubrication
...protect against wet or humid operating conditions**



In 48 Hour Synthetic Sea Water Test, rust from plate coated with ordinary grease has turned water yellow (left). Water remains crystal clear in beaker with plate protected by new Sun rust-preventive grease (right).

Water contamination in grease-lubricated parts reduces lubricant life, promotes corrosive wear, and may lead to failure of bearing surfaces.

Sun Oil's new rust-preventive greases are specially fortified to overcome this problem. They give extra protection against both direct water contamination and indirect water contamination caused by high humidity and condensation during overnight and week-end shut downs.

Available at the price of ordinary greases, new Sun rust-preventive greases come in many different grades. For complete information, see your Sun representative, or write for Sun Technical Bulletin 38. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. GI-1.

INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY
PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO & MONTREAL



PLEASE TURN TO NEXT PAGE



New buttery grease now protects against rust under highly adverse moisture conditions.



New tacky grease prevents throw-off...reduces consumption. Highly resistant to water.



New high-temperature grease for anti-friction bearings. Exceptional stability, longer life.

NEW SUN RUST-PREVENTIVE GREASES SAVE YOU MONEY IN 3 WAYS

- Prevent wear...and rust...on 90% of all grease jobs
- • Serve as low-cost rust preventives for storing shop equipment
- • • Save storing and handling special-purpose greases

Sun Oil Company's new greases are fortified to protect against rust. Lubricity is improved and wear is reduced because grease-lubricated parts are now protected at all times against rust and corrosion caused by condensation and process water.

The effective life of these new rust-preventive greases is approximately twice that of conventional greases operating under wet conditions. And, their extra protection against moisture permits their use as a rust-proofing medium for shop storage of tools and parts.

Competitively priced with ordinary greases, these new greases can be applied by any conventional method...brush, swab, pressure gun, or through central pressure systems.

Because of their improved quality, these new Sun greases will now perform 90% of all grease lubrication jobs. You reduce grease inventories...lessen the risk of using the wrong grease...simplify your handling problems.

For complete information, see your Sun representative or write **SUN OIL COMPANY**, Philadelphia 3, Pa., Dept. GI-2.



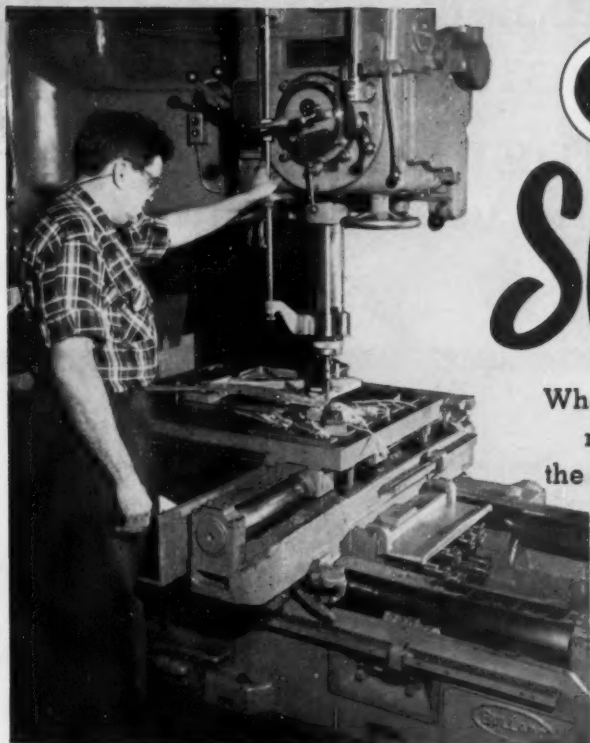
INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY, PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

ACCURATE LOCATING PERFORMANCE

Acclaimed By Customer with . . .



BULLARD

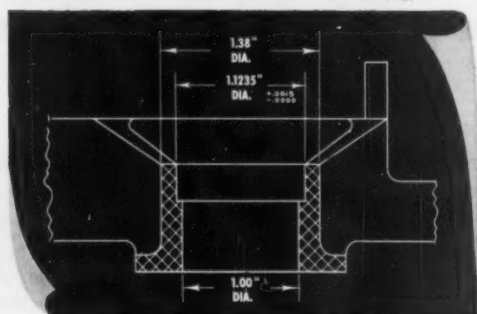
Spacer Table

Where close tolerances must be maintained on repetitive pieces the Bullard Spacer Table is a "natural"

"The machine is simple to operate. We have found the Bullard Spacer Table very useful in our work", says a foreman at San Diego Division of Convair, "It eliminates the necessity of zeroing to a set position. And there is no chance for error, which is important when you make accurate parts for airplanes."

This same accuracy to close tolerances can be applied to your drilling, reaming or tapping operations without the high cost of jigs or fixtures.

Identical machining operations on each of three holes for battery carriage are performed on the Bullard Spacer Table.



OPERATION DATA

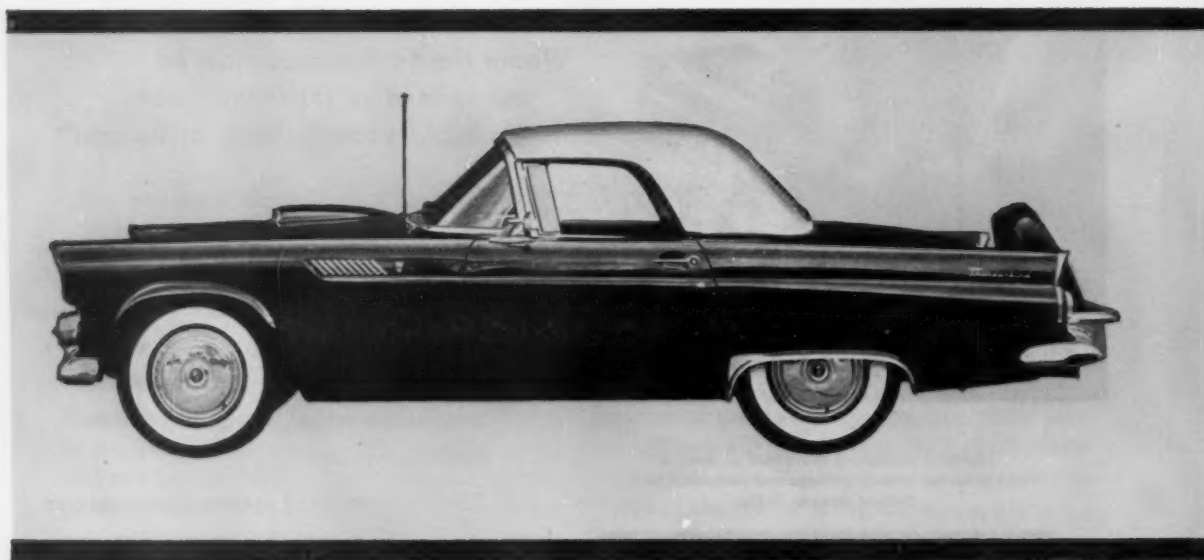
OPERATION	SET-UP TIME	UNIT TIME
Drill 1" dia.	.70	.2066
Counterbore 1.1235" dia. at 1.000 dia. .350" deep	.25	.0566
Face 1.38" dia.	.25	.0356

CALL YOUR NEAREST BULLARD REPRESENTATIVE
OR WRITE FOR SPACER TABLE CATALOG TO

THE
BULLARD
COMPANY
BRIDGEPORT 2, CONNECTICUT

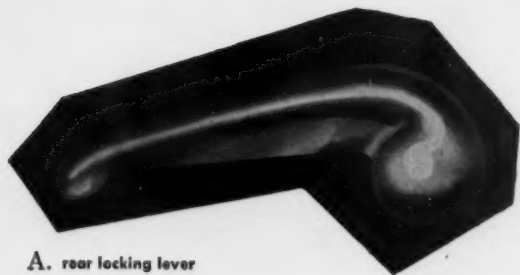
MUELLER BRASS CO. FORGINGS

give THUNDERBIRD tops
a snug fit the year around



The Motor States Products Division of Detroit Harvester Co.—a major supplier of top assemblies for convertibles—has found Mueller Brass Co. forgings an ideal answer for securely fastening down the tops on the Ford Thunderbird. In a summer shower or in the snow of winter the top is always snug and draft-free. There are a pair of each of the three Mueller Brass Co. forgings shown here used in locking the Thunderbird top securely around the sides and rear deck. The locking lever (A) is incorporated in the top and operates a locking pin that fastens into the rear hold down clamp (B). A pair of side hold down clamps (C) are located just behind each

door opening and clamp fasteners on the top hook into these forgings to rigidly hold the top in position. These forgings hold the necessary close tolerances and provide an excellent surface for buffing and chrome plating. In addition, the price is favorable and deliveries are good. For these reasons, as well as their inherent strength and durability, a switch to Mueller Brass Co. forgings can prove advantageous. Write today for our engineering manual (No. H-58565) . . . or better yet, call in one of our engineers to investigate possible forging applications in your products.



A. rear locking lever



B. rear hold down clamp



C. side hold down clamp

• WRITE TODAY FOR THE ENGINEERING MANUAL YOU NEED



- | | |
|---|--------------------------|
| Mueller Brass Co. Forgings
Engineering Manual H-58565 | <input type="checkbox"/> |
| Tuf Stuf Aluminum Bronze Alloys
Engineering Manual H-58563 | <input type="checkbox"/> |
| 600 Series Bearing Alloys
Engineering Manual FM-3000 | <input type="checkbox"/> |
| Copper Base Alloys in Rod Form
Engineering Manual FM-3010 | <input type="checkbox"/> |

METALS AND ALLOYS REVIEW



by FRANK M. LEVY, Director of Research

The other day one of our sales engineers stopped in to discuss gear applications and the subject got around to the amount of zinc permissible in gear and bearing alloys. Engineering books state that zinc is not desirable in bearing alloys. While this statement is true as regarding the commonly used copper-tin and copper-tin-lead alloys, it does not necessarily apply to other types of alloys. The 600 series bearing alloys, in which I am keenly interested, depend upon a high zinc content along with several other metal constituents to provide them with their fine bearing properties.

My explanation to our sales engineer was somewhat as follows: The question as to whether or not zinc is detrimental in a bearing alloy depends upon the remaining constituents in the alloy. A comparatively small amount of zinc is detrimental in a phosphor bronze alloy containing 80% copper, 10% tin and 10% lead. A zinc content of 4% is permissible in a bearing alloy containing 88% copper, 4% tin and 4% lead when used in an application not subject to heavy loads. In these alloys the tin combines with some of the copper to form a hard copper-tin constituent which is distributed through the soft copper matrix, or mat of copper. The higher the percentage of tin present, the greater the quantity of hard copper-tin constituent formed. Zinc also combines with copper increasing the hardness of the matrix. Therefore, when zinc is present along with a high tin content, the matrix becomes too hard and is "out of balance" resulting in poorer bearing qualities.

In the 600 series, copper, silicon, manganese, etc., are present with zinc. There is sufficient manganese present to combine with the silicon to form a purple manganese silicide which is embedded in the copper-zinc matrix. Since the manganese-silicide constituent has a much higher micro hardness than the copper-tin constituent in phosphor bronze, the matrix of the 600 series alloys can have a higher hardness without impairing the bearing properties. In this instance, zinc is not detrimental but desirable because it produces an alloy with a high Brinell hardness which resists pounding and distortion.

Like many engineers, we, too, were skeptical of the bearing properties of the first 600 alloy developed. A manufacturer of worm driven truck transmissions was having difficulty with the failure of chill cast high tin bronze gears in busses used in the hilly section of Los Angeles and Pittsburgh, and solved his problem by using gears made from 600 metal.

Since that time, we have had over a hundred successful applications on difficult bearing problems where cast bearing bronzes have failed. An interesting observation is that once a customer uses 600 alloys, he not only finds other applications, but continues to use it over a long period of years. Our original customers are still on our books.

In conclusion, we agree that zinc is detrimental to the bearing properties of the phosphor bronze type of alloys, but is of benefit to the 600 series alloys, as it makes a harder matrix, permitting the alloy to resist pounding action better than the softer phosphor bronze alloys.

I've just about run out of space for this time but we'll have another subject for discussion later. If you have any problems or questions about non-ferrous alloys, just write me here at Mueller Brass Co. and we'll see what we can do.

MUELLER BRASS CO.

PORT HURON 24, MICHIGAN

170

January 12, 1956

19



When you need expert foundry advice ask the man who
CALL IN A REPUBLIC PIG IRON

His thorough knowledge of foundry operations is based upon a combination of metallurgical training and years of actual foundry experience. He knows all types of pig irons and their characteristics. He knows what they will do or will not do under certain conditions. He keeps up to the minute on all the latest foundry techniques.

The Republic Pig Iron Metallurgist is a welcome visitor in hundreds of foundries. They rely on him for advice on pouring problems, molding practice, improving efficiency. Or for help on reducing costs, improving castings and increasing output.

Republic is the only producer of a complete line of merchant pig irons. Therefore,

REPUBLIC



World's Widest Range of Standard Steels



knows his irons— **METALLURGIST**

the Republic Pig Iron Metallurgist is able to recommend the proper grade of pig iron for a specific job without hesitation or prejudice.

If you have a foundry problem, ask the man who knows his irons—call in a Republic Pig Iron Metallurgist. His service is confidential and without obligation. Mail the coupon for prompt action.

STEEL

and Steel Products

January 12, 1956

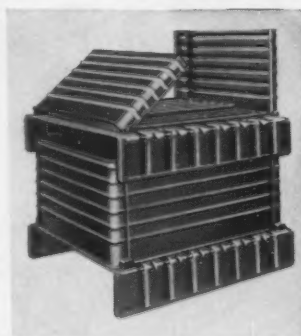


FOR HANDLING CASTINGS—Republic Chain Slings provide an exceptionally high degree of safety. Made by Republic's Chain Division, they are available in Alloy Steel, High Test Steel, and Wrought Iron. All are proof tested and warranted to meet or exceed specifications. Each type has a specific use. A Republic Chain Engineer will tell you promptly which chain sling is best suited to your particular requirement.



FOR STORING CASTINGS—Wedge-Lock Steel Shelving provides maximum loading in minimum floor space. It's specifically designed for high stacking of enormous weights—with no sagging, no swaying, no buckling. Joints actually get tighter as weight increases. Wedge-Lock Steel Shelving is completely flexible to meet changing needs. It can be assembled quickly and easily. A product of Republic's Berger Division.

FOR SHIPPING CASTINGS—Republic's Pressed Steel Division makes the PB-127 Collapsible Box. It's designed for heavy-duty service. It can be tiered when loaded or empty—collapsed or set up. All parts are permanently attached. The PB-127 unit solves the problem of storing and shipping empty boxes and can save you up to 66% of your storage space. Republic Materials Handling Specialists will help you design units to meet your specific needs.



REPUBLIC STEEL CORPORATION
3104 East 45th Street, Cleveland 27, Ohio

☐ Please have a Pig Iron Metallurgist call.

I am interested in more information on:

☐ Republic Sling Chains ☐ Republic Collapsible Boxes
☐ Wedge-Lock Shelving

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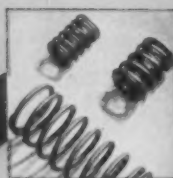


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Clock or Motor



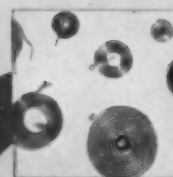
FLAT SPRINGS
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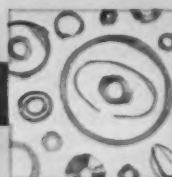
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BELLEVILLE SPRINGS
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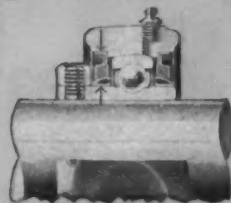
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Next time you're bearing comparing . . . look for these **important differences**

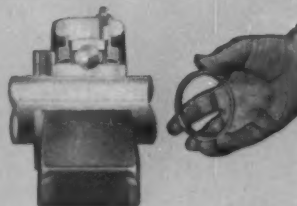


POSITIVE PROTECTION from moisture, dust and dirt is accomplished by seals extending from housing to inner ring. All aligning surfaces are enclosed in lubricant chamber.

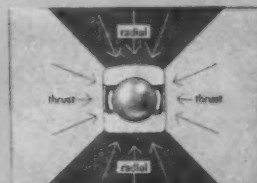


Series 200 Ball Bearing Pillow Blocks are part of industry's most complete line of ball and roller bearing blocks.

AUTOMATIC RELIEF OF EXCESS GREASE PRESSURE. Patented revolving inner seal members have escape holes enabling excess lubricant to pass out through opening around periphery of seal. No danger of seal being forced out . . . no chance for high pressure to damage bearing.



HIGHEST CAPACITY obtainable to carry heavy radial, thrust or combination loads is provided by single-row, deep-groove design.



GREATER STRENGTH. Base of block is cored to provide uniform metal thickness, assuring a sound casting, free from distortion.



*They're all present
only in LINK-BELT
ball bearings*

LINK-BELT

Ball and Roller Bearings

THESE important bearing differences show up in the performance of your equipment. For instance, a bearing may be subjected to shaft misalignment throughout its working life. Link-Belt's lubricated self-aligning feature assures free rolling . . . maintains maximum efficiency under any service condition. And Link-Belt alone offers that advantage in both ball and roller bearing blocks.

Whatever your bearing requirements, look to Link-Belt. All types and sizes of Link-Belt bearings are available from stock. Ask your Link-Belt office or authorized stock carrying distributor for Data Book 2550, containing complete information on the entire Link-Belt line.

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarborough (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,714-A

Up to 40% higher tightening torques — a feature of new High-Torque Unbrako socket set screws

RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)				
SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

Compare UNBRAKO-recommended tightening torques with those of ordinary socket set screws and you readily see why you can set an UNBRAKO and then forget it. The reasons are simple. UNBRAKOS have deeper sockets, which give you better purchase with the wrench; rounded socket corners, which eliminate the sharp corners where cracks start; fully formed threads, which make them stronger; and knurled cup points, which keep them tight.

Let's see just how the development of fully formed threads make the new High-Torque UNBRAKO stronger. The metal is compressed into the closely knit grain structure that you see in the illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. An UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Conversely, cut or ground threads have straight flow lines—lose thread form at root diameter.

You can't buy a better screw than an UNBRAKO. And you can't get full *high-torque* performance without a "High-Titan" UNBRAKO Hex Key—the high-ductility, precision internal wrenching tool. See your authorized distributor today. Or write STANDARD PRESSED STEEL CO., Jenkintown 17, Pa.

STANDARD PRESSED STEEL CO.

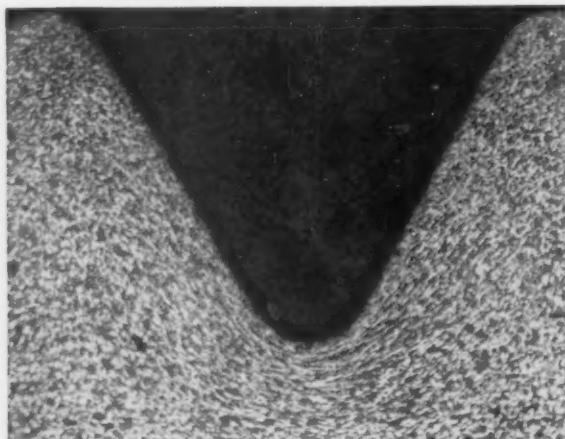
UNBRAKO

SOCKET SCREW DIVISION

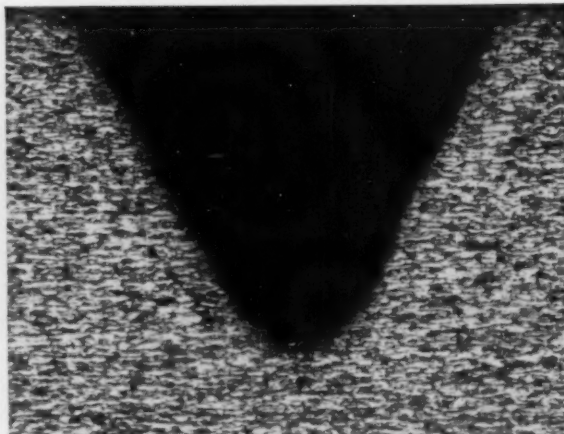
SPS

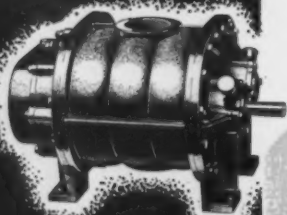
JENKINTOWN PENNSYLVANIA

UNBRAKO SET SCREW THREADS

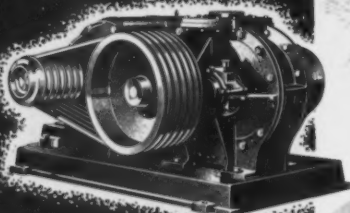


ORDINARY SET SCREW THREADS

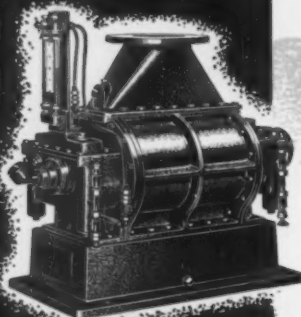




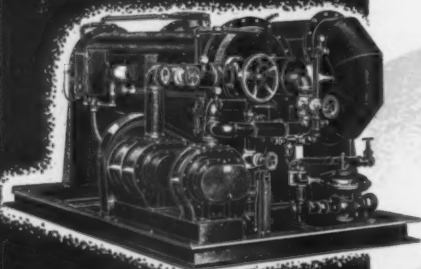
BLOWERS for such widely varying needs as lifting a damaged airplane or injecting air into water to provide oxygen for safe transportation of fish in tanks. Capacities as low as 5 cfm or up to 100,000 cfm or higher.



GAS PUMPS for inflating balloons, manufacturing electronic tubes or extracting gases from contaminated areas for test samples. They'll deliver as little as 5 cfm or as much as 50,000 cfm or more.



METERS help save money or make more profits by accurately measuring almost any kind of gas which you buy, sell or use in manufacturing processes. "Cash register accuracy" from 2,000 to a million cfh.



INERT GAS GENERATORS make hazardous operations safer from fire or explosion. They protect people, plants and products... and often return more than they cost in reduced insurance premiums. They'll produce inert gas for almost any use. You can have as much as 50,000 cfh or as little as 1,000 cfh in mobile or stationary equipment.

How to pull DOLLARS out of the AIR

New ways to put air (or gas) to useful, profitable work are constantly being developed by engineers and designers. These result in more effective machines and devices—frequently replacing slower or more expensive methods—often reducing the first cost of the equipment itself. These results are accomplished . . .

by resourceful engineering

In many of these applications, designers and engineers have utilized standard R-C equipment, sometimes with special adaptations. The problem may call for a small or large volume of air, moved by R-C Blowers or Exhausters. It may require vacuums, produced by R-C Vacuum Pumps. Perhaps metering or pumping of gas is needed, also met by R-C products. In any event, the solution is often . . .

aided by Roots-Connersville experience

If you use or build for resale any product which might be improved by utilization of air at moderate pressures, by vacuums or by moving gas, perhaps we can help you. Even if you have only the ghost of an idea that might pull dollars out of the air, we'll gladly work with you.

Just address:

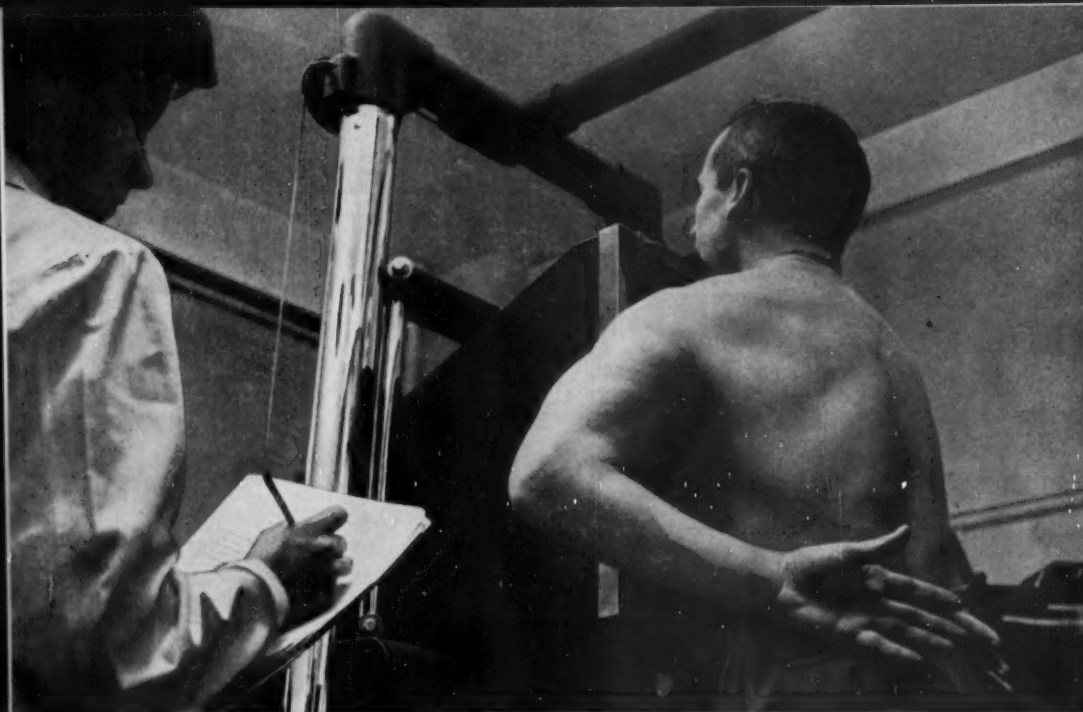
Product Development Manager, Roots-Connersville Blower Division,
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ROOTS-CONNERSVILLE BLOWER

ONE OF THE DRESSER INDUSTRIES





GENERAL REFRACTORIES

better health . . . because of BRICK

It is hard to associate X-rays with brick—the refractory brick which contains the fires of industry. Yet, were it not for brick these fine X-ray machines would never be made, and there'd be no electricity to operate them.

From an autoclave to an automobile, from a scalpel to a skyscraper, everything that's made and every form of transportation, communication and power owe their existence to refractory brick.

Our job is to provide that brick. In infinite variety. Compounded to formulas as precise as a prescription, in the world's largest refractories research laboratory. Moulded from materials brought from many countries in plants strategically located across our country to serve industry swiftly . . . dependably . . . economically . . . everywhere.

GENERAL REFRACTORIES COMPANY
Philadelphia 2

A COMPLETE REFRACTORIES SERVICE FOR THE STEEL INDUSTRY

OLIVE HILL BF and OLIVE HILL HI-FIRED brick rank high in any list of prominent and widely used brands of blast furnace refractories. Manufactured from dense-burning Kentucky flint fire clays by Grefco's unique manufacturing processes, OLIVE HILL brick set a standard for blast furnace refractory quality and workmanship.



Grefco processing of OLIVE HILL brick entails:

1. Careful selection, testing, stockpiling and blending of fire clays to insure uniform raw material quality.
2. Grinding and screening to prescribed formula to promote high density of product.
3. Efficient deairing during brick forming, also to promote density and proper physical structure.
4. Careful firing to exacting temperature schedules to yield uniform high quality brick.
5. Close inspection of final product with gauging and sorting of brick to close size tolerance.
6. Quality control by statistical analysis procedures for the manufacturing processes.

In service, OLIVE HILL blast furnace brick, both BF and HI-FIRED, have produced many splendid performance records in the past. OLIVE HILL linings in presently operating furnaces, are giving outstanding performance and are more than meeting the increasing requirements of the expanding American Iron and Steel Industry.

Black & Decker® Electric Tools are **POWER-BUILT** TO CUT COSTS!

Service... one of 42 B&D factory service branches is located "next door" to you. Staffed by experts to give fast, efficient service, genuine replacement parts.



We don't buy motors—we build them!

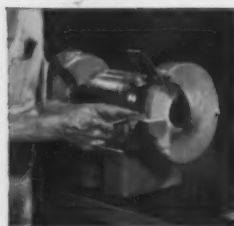
The heart of your electric tool is the motor—completely built by Black & Decker! All the power you need *and then some*—because each motor is built for a specific tool and the job it must do! B&D motors always *stand up!*



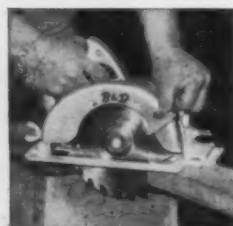
DRILLS—32 models



VACUUM CLEANERS—1 model



BENCH GRINDERS—4 models



SAWS—5 models

B&D tools are *power-balanced* for greater speed, power and accuracy—which means faster, better production, lower costs. B&D tools, because of their lightweight and compact design, guarantee reduced operator fatigue. And B&D tools are *Power-Built* to last—like this B&D Sander, which is versatile enough for all your most exacting finishing jobs . . . sanding, grinding, burnishing, cleaning . . . stands up easily under 'round-the-clock operation—and will go on like this, cutting your costs, *for years!* See your B&D distributor today or write for free catalog to: THE BLACK & DECKER MANUFACTURING COMPANY, Dept. 7801, Towson 4, Maryland.

LOOK IN THE YELLOW PAGES UNDER "TOOLS-ELECTRIC"



Black & Decker®
PORTABLE ELECTRIC TOOLS

NEWSFRONT

Getting Ready For The Thaw

Gas burning radiant heaters may help ore shippers thaw frozen gondola car loads. A demonstration of new portable units in Toledo is attracting wide interest from railroads, ore producers and utilities. If workable, these units could replace conventional steam thawing pipes.

Remoteness A Penalty

Warehouses most remote from steel producing centers are feeling the greatest pinch on mill receipts. Many in Kansas, Texas, Oklahoma and other areas of the South and Southwest are laying in foreign steel where possible. They are also buying from Eastern mills on an F.O.B. basis and swallowing freight charges to accommodate customers. Several large mills are continuing the same tonnage shipments into these areas, but have dropped them percentage-wise. Others have pulled out of the areas entirely as far as warehouses are concerned.

Piggy Banks Put Squeeze On Mint

Nationwide shortage of pennies has mint officials deeply concerned. Despite record production of about six million pennies per day last month, Federal Reserve districts are clamoring for more. Major drain is coming from piggy banks, parking meters and vending machines. Add to these the many local sales taxes and it amounts to a major headache on how to equalize penny output with demand.

Make Change In Maintenance Thinking

Competition in the trucking industry has altered thinking about truck maintenance. Experience shows that it is more economical to overhaul engines and transmissions when they need it rather than on a mileage or time basis.

Order Standby Equipment

Despite slowdown in military shell procurement this year, sale of equipment to standby shell lines continues to be good. At least five such lines are currently getting more equipment to avoid obsolescence.

Want More Chemicals From Coke

Despite the big advances in the amount of chemicals-from-coke capacity installed by the steel industry during the last two years, even greater advances are likely this year. Chief emphasis will be on getting higher chemical output from existing coke oven facilities. There's need for more coke, but even plants with adequate coke oven capacity will beef chemical output.

Concentrate In A Cemented Can

Cemented sideseam cans for frozen orange juice concentrate have attracted wide customer appeal—so much so that they'll go to market under more than 100 different labels in 1956. The solderless container, an outgrowth of the search for a tinless can, permits more attractive lithography.

New Machines Speed Billet Cutting

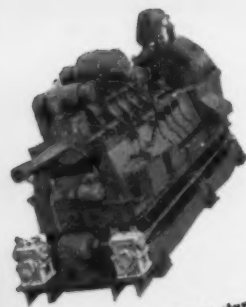
New high-speed abrasive cut-off machines are turning in remarkable production records in cutting off billets. One such machine sliced through a 12-in. alloy steel billet 60 times faster than existing equipment. The same machine, used at slower speeds, can cut titanium without fracturing the metal.

Do-It-Yourself Computer Scores Hit

A \$700 electronic analog computer kit aimed at the academic field has made an unexpectedly strong hit with industry. Active interest from the industrial quarter is running 2 to 1 over that from educational institutions. In performance, the computer is claimed to be equivalent to ready-built models costing considerably more.

Take A Close Look At Phony Budget

Some of Washington's foreign experts look upon Moscow's claim of a 10-pct cut in military spending as strictly phony. They calculate the Reds actually have plotted a 16-pct increase in arms spending in their new budget, concealing the increase among a dozen innocent sounding programs as "residential housing." U. S. atomic experts are particularly intrigued by a 93 million ruble "mystery fund" in the budget.



Cleveland worm gearing is standard on these fully-automatic machines which thread oil field pipe to rigid A.P.I. specifications, ranging from 1 1/4" to 13 3/4" O.D. In addition to worm gearing inside the machine, note two Cleveland Worm Gear Speed Reducers in foreground.

On job 18 years, **CLEVELAND** drive is good as new

AFTER 18 years of continuous service in a well-known pipe mill in Pennsylvania, a Stamets pipe threading machine had its first major overhaul. When the Cleveland worm gearing was removed from the machine it looked almost like new, showed only slight traces of wear. This unretouched photograph reveals the splendid condition of both the worm and gear. In fact, the gearing is in such fine shape that it was put right back in the machine—probably good for another 18 years of strenuous pipe threading.

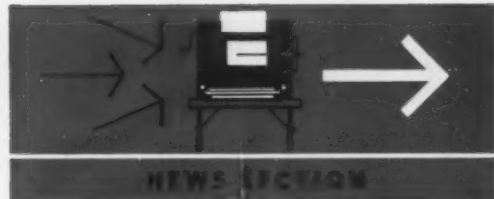
This example is one of thousands of Cleveland worm gear drives, many made 25 and even 30 years ago that are still in service today. They serve in every phase of American industry, drive every type of mechanical equipment where a powerful, trouble-free, right-angle drive is wanted.

For full presentation of the many types and sizes of Cleveland worm-gear drives available, write for Catalog 400. The Cleveland Worm & Gear Co., 3282 E. 80th St., Cleveland 4, Ohio.

*Affiliate: The Farval Corporation, Centralized Systems of Lubrication.
In Canada: Peacock Brothers Limited.*



CLEVELAND
Worm Gear
Speed Reducers



You Can Ease Engineering Bottleneck

Using engineers as technicians is costly waste of engineering manpower . . . Leading companies push programs to get best out of scarce engineers . . . Training programs free engineers from routine.

♦ ARE YOU overpaying your engineers?

You are if you're using them on jobs that clerks or technicians could do just as well—or better.

Many companies are learning they can beat the engineer shortage and save money at the same time by assigning the routine jobs to qualified non-engineers and freeing their engineers for more creative work.

"Our engineers do not do drafting," says the research director of a big auto company.

Another outfit is using BA and BS math majors for routine design analysis and production engineering problems under supervision of an engineer.

the engineering workload of many companies. Westinghouse Electric Corp. estimates a 14 to 23 pct saving in engineers' time in departments where a specific program of substitute personnel has been set up.

Two for One

The same company's Air Arm Div. started virtually from scratch in 1951 and built up a 1500-man operation. This expansion, in a field heavily loaded with development work, would not have been possible without generous use of engineering assistants.

Dr. S. W. Herwald, engineering

manager of the division, figures roughly two supporting people have been used for each engineer. He is enthusiastic about the performance of technicians but warns against unbalanced operations. "An excess of technicians can result in uninspired engineering," he says.

This is something to think about but right now the swing is in the other direction. Engineers are doing too much non-engineering work. Which brings up the question: Where do you find the substitute personnel?

Technical institutes are one

How They Do It

An older woman schooled in accounting machine technique has been trained by a third company to operate a computer. An engineer formerly did the job.

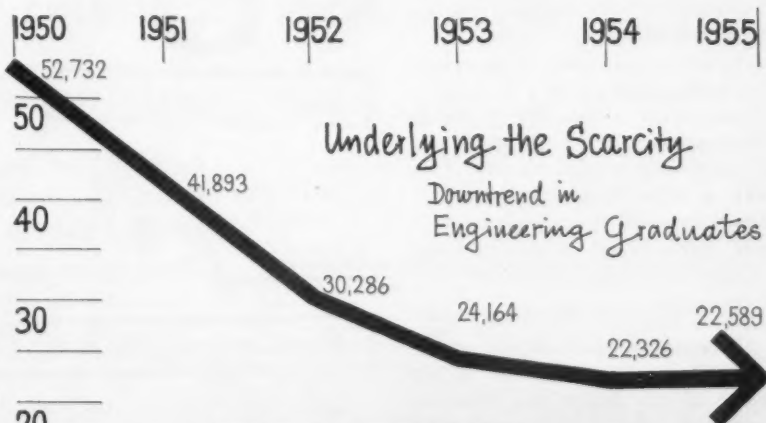
Northrup Aircraft and General Electric use specially trained non-engineers to write technical reports.

In a Midwest plant, a clerk is assigned to each one or two engineers to take instrument and meter readings, to total parts costs, write material bills and so on.

Chicago Pneumatic Tool Co. uses student engineers from Fenn College and the University of Detroit. Students go to school six months, work the other half of the year at drafting, inspecting and other tasks that a full-fledged engineer would find dull and discouraging.

These and similar applications are making a significant dent in

Engineering Graduates dwindle



SPECIAL REPORT

source of specifically trained people. In addition, some engineering schools now run 2-year programs for engineering technicians. Such a man often earns credits for a BE or BS degree, may be upgraded through training or night school.

Apart from these formally designated technicians, companies are finding broad sources of technically capable people in more remote areas.

At Monarch Aluminum Co., Cleveland, John Keating, vice president and production manager, reports success in upgrading men with shop experience to engineering-factory liaison work.

Several companies find they can use student engineers from nearby colleges for part-time work. Graduates of general colleges—particularly those with math and physics majors—are making a good showing in purchasing, semi-technical sales and production work.

Training Programs

Westinghouse has made effective use of the non-engineering graduates, giving them about 5 months' training and then moving them into quality control, production scheduling and other jobs previously held by engineers. They have shown both aptitude and enthusiasm in technical jobs.

In this connection, the point was made that it could be a mistake to insist on an engineering degree at the expense of other qualifications. A man with a general education and a high leadership potential could prove more valuable than an engineer scraped from the bottom of the barrel.

Engineering Teams

Accounting machine operators, clerical personnel—there is no limit to the fields that produce men and women capable of good service in engineering departments. The main qualification is technical aptitude.

Where do you use engineering assistants? How do you decide who does what? Engineers Joint Council is tackling the problem

of developing balanced engineer-technician teams. Educators and industry spokesmen will air their views in New York sessions Jan. 26. The problem is mainly one of identifying strictly engineering functions.

"The particular province of the engineer is in work calling for original thinking," says Guy Kleis, manager of the Central Technical Departments at Westinghouse.

Mr. Kleis distinguishes between original and complex work. Custom tailored motors can be drawn up by an experienced technician. He follows the standard design and the original computations, makes modifications for the special application.

Can't Do Everything

On the other hand, a full-fledged engineer must be used when a standard line of motors is to be developed. Here there is no complete pattern to follow. The background, judgment and originality of the engineer come into play as he departs from proven lines. The quality of thousands of models will depend on his ability.

If this makes the engineer sound like a fairly rare bird, that's exactly what many companies have decided. They feel every engineer-

ing class yields a certain percentage of men who will never be more than technicians.

Which makes the job of tracking down routine work a touchy one. You may be put in the position of telling an old M.I.T. man he has been doing a clerk's job for the past 40 years. For this reason, younger groups are probably the best place to drive for better time use.

Participation Helps

In this area, Westinghouse has had good success in inviting engineers to participate in surveys of their own jobs. For two weeks, nine engineers kept track of their time. Their figures indicated that addition of one clerk and one technician could save 13.9 man-days or 15.5 pct of the engineers' total time. Actual installation of the new people showed that these calculations were conservative.

One automotive company breaks down each engineering job into component steps before starting. Through this method the company is able to pinpoint steps that do not require a graduate engineer.

Surveys by company and consulting groups are accounting for some downgrading of engineering functions. In some cases, the switch is coming without any

What **is** Being Done About It?

United Aircraft Corp.

Encouraged an engineering school to set up branch.

Result

Spent \$260,000 to help pay school expenses.

→ Expects to have 300 engineers enrolled.

Westinghouse Electric Corp.

Offers programs for advanced study in universities.

Reimburses half tuition at completion of each course; remaining half at completion of whole program.

Result

→ Has 800 enrolled in graduate engineering.



TECHNICIANS assist engineer (center) in evaluation of flight control system at Air Arm Division of Westinghouse Electric Corp. in Baltimore.

planned effort. But most changes are probably the result of necessity. Engineers aren't available; technicians are used and they do the job.

Apart from the question of substitute personnel, companies offer various suggestions for getting more mileage out of engineers.

"Keep assignments specific," says Dr. Herwald. As a simplified illustration, he says an engineer should not be told just to design an amplifier; the limits and goals of his work should be clearly defined.

Use Time Savers

Make them turn projects loose, say others. They say there is a tendency for research engineers to cling to a project after it has reached the development stage, and for development engineers to get into specific design. The result is a time loss and an overlapping of effort.

Computers and other engineering tools are, of course, time savers. Educational programs are a necessity for modern, alert engineering.

Consultants can be used to ease the engineering load in special cases. Defense work, particularly development projects, are usually jobs with a high engineering content.

The whole problem of an engi-

neer shortage stems in part from a decline in the number of technical people graduating from colleges. In 1950, over 52,000 received engineering degrees. Last year, there were only 22,585.

Graduate Work

Many companies are trying to produce more and better engineers by means of educational programs.

Westinghouse offers three types of educational assistance: (1) scholarships to high school students; (2) tuition help for workers taking night courses towards a degree; (3) a program of graduate and supplementary study for engineers.

Westinghouse makes tuition payment contingent on completion of course and programs. Company now has about 1200 engineers taking courses—has seen more than 350 gain advanced degrees.

Attract Engineers

United Aircraft feels that facilities for advanced study are important not only in improving engineer quality but in attracting new ones. Company recruiters signed up only 169 out of a hoped-for 300 engineers last year. It was felt that the absence of nearby educational facilities discouraged some from joining the company.

To remedy the situation, United persuaded Rensselaer Polytechnic Institute to open a branch graduate school near South Windsor, Conn. The company is spending \$260,000 on the school, expects to have 300 engineers enrolled by next June.

Educational programs and use of technicians have the same aim: More efficient engineering.

Take Engineers off Routine Jobs!

By hiring:

Tech school graduates

Student engineers on part-time basis

Math or physics majors

Business machine operators

Upgraded production workers

To do:

Production scheduling

Quality control

Purchasing

Sales engineers

Field service

Computer operation

Report writing

Design modification

Engineering-factory liaison

MAN-MADE BRAINS: Show Human Profits

Manufacturers of electronic calculators look for bigger sales in 1956 . . . Expanding use from payroll chores to production problems is big factor in growing market . . . Prices vary—By K. W. Bennett.

♦ **ELECTRONIC BRAINS**, once strictly concerned with white collar applications of payroll and cost figuring, are working themselves into production lines.

The expansion of functions of the electronic calculator is the big reason why their manufacturers are looking back on a record year. Their own calculators predict a new 1956 sales high.

Expands Use

The industry's biggest producer, IBM, did about \$500 million business, and the 110 or more other producers shared in shipping more electronic calculators than ever before.

Why the rush? The electronic brain seized the public's imagination during the 1952 election with the famous Univac predicting the outcome with uncanny accuracy.



Operation of the keyboard on electronic data processing console is music to the ears of management.

IBM, Univac Div. of Sperry-Rand Corp., Burroughs, and National Cash Register are major producers. Others in the field include RCA, Raytheon, Ramo-Woolridge, Telecomputing, and an expanding list of possibly 100 more.

Big Backlogs

As the producer list expands, competition for the lower priced market is becoming keener. Electronic computers as low as \$25,000 are on the market, and shortly a model at half that price will be announced.

Meanwhile, one major producer reports that current backlogs of unshipped electronic calculators on order exceed the firm's total installations to date. While this is an optimistic outlook, deliveries of "shelf" models generally range from several months to over a year.

The customer has a wide choice and range if he wants to enter the computer market. He can rent a computer for as little as \$200 a month, though most models are considerably higher. \$650 per month is still a low rental for light computing equipment, and \$3000 much more common.

Customers must feel the equipment is worth it. Several companies with high powered equipment at the top of the price range (which can go \$3 million) have augmented the original unit with a battery of smaller electronic calculators.

For the part time users, who don't have the volume to buy or rent, more computing centers are on the way. One manufacturer with a New York computing center where his equipment can be used by business firms, will open



Experiments with transistors and printed circuits are aimed at reducing size and cost of calculators.

centers at Los Angeles, Chicago, Boston, and St. Paul in the near future.

Just what makes the calculator so valuable? Primarily, it thinks faster than a man or battery of men. But it can also make choices, store statistics, arrive at conclusions.

On a routine payroll job it will balance job cards against attendance cards; select whichever is greater, the guaranteed work rate or piece work rate; total regular and overtime pay; figure federal withholding tax and deduct it; subtract voluntary deductions from net pay, total all these figures for the year-to-date; total savings bond balance and signal that bonds are to be purchased; figure labor distribution totals by job by department; figure current earnings and year-to-date.

STEEL: Hold Onto Your Hat In '56

A year of big business and big decisions is in the offing . . . Steel people face problems with customers, production, finances, politics and labor . . . Producers more aggressive on prices—By Tom Campbell.*

◆ **THIS YEAR** in the steel industry will separate the men from the boys. Sure, sales will be no trouble. But the problem of laying the groundwork for a strong, long-term, virile industry that will meet the country's challenge will come in 1956.

But before that nut is completely cracked the immediate challenge is from steel customers. Their clamor for steel this year will rival any other year in history—from a tonnage standpoint. Mixed in with the customer relations outlook is the price problem. And if that isn't enough there is labor to contend with in June.

What's Ahead?

Steel people are always talking about toughness in their product. Here are a few things facing steel executives this year which will take a brand of toughness not found in steel:

Steel Demand: It will be more turgid this year than at any time since the Korean War period. Further, it will crowd actual steel capacity during the full year. Steel firms will have to exercise the utmost care in trying to keep order inflation off the books. Whether or not they succeed remains to be seen. It is doubtful if they can control precisely the amount of tonnage booked.

Whipping Boy: Again the industry will have to play the whipping boy at Washington while Congressmen try to get votes by badgering top steel officials. They have had such extensive experience that the industry will not suffer too much. But the fireworks will be gigantic if Congressmen can get the press interested enough.

Financial Strength: Steel earn-

ings will have to be kept at a level which will attract new investors, keep the ones in steel and hold out promise for future share owners. If the industry falters in this move it will not be the giant it is cracked up to be. But there are advance indications the steel industry will show this year that its management and growth have taken a sharp turn for the better.

Realistic Replacement: The industry this year will have to face the cold fact that it, like other industries, cannot keep up the present pace unless its tools are modern. Hundreds of millions are spent each year but it is a fact that mills and furnaces at some areas in the industry are outmoded, obsolete and too costly to operate. The only thing that supports them has been the heavy steel demand. This year decisions will be made to remedy this situation on a broad scale.

The Price Question

These items are a few of the big ones that are on the steel calendar for 1956. At the base of most of them is the price question. Steel people have always had an inferiority complex on the price they charge for steel.

Those days are gone. The steel official who drags his feet on realistic prices is not for the "new era." The cost of wages, equipment and replacement is something that haunts the second-in-command (those who will take over in the next several years). That is the major reason why steel base prices and extras are now being revised upward. That is also why they will go up again after the June wage negotiations—or after the strike; if there is one.

*Editor-in-Chief of The Iron Age. From an article written especially for The Exchange Magazine, published by New York Stock Exchange.

Tom Campbell Predicts

Steel Production

Output will reach 118-120 million ingot tons; bad time for steel people from customers, government officials, and politicians.

Steel Expansion

Capacity will rise more than 12 million tons in next three years, as much as 16-17 million in next five years. After that: a new round of expansion.

Iron Ore

Present reserves are based on

assumption that steel output would average 85 million tons a year. Prospects of production averaging between 90 million tons and 145 million tons during next decade calls for "new look" at ore situation. Ore outlook will make big news in '56.

Steel Labor

Good business will help labor get what it wants this year. But there may be trouble over supplemental unemployment pay demand, union shop, and wages. Odds now are 60-40 for a strike, may be down to 50-50 in June.

SCRAP: Worries in the Midst of Plenty

Industry fears being caught in dropping market . . . But strong demand is assured for most of year . . . Steel strike is also major worry to trade . . . Exports strongly defended—By G. F. Sullivan.

◆ **DESPITE RECORD** high prices in most markets, an excellent year behind it, and prospects of continued good business through 1956, the scrap industry still has its worries.

Even at a time when prices are high and profits fat, the prospect of a fast breaking market carries with it a great element of risk. So the scrap industry has the double concern of how long will prices stay at the peak, how fast and far will they drop when they do.

Since this billion dollar industry is carefully watched by business forecasters everywhere, the logical question is: Should these doubts be shared by other industrialists?

Most of their collective worries were aired last week as scrap

dealers and brokers met in Chicago for the 28th annual convention of the Institute of Scrap Iron & Steel.

Demand Solid

Leonard H. Krieger, Southwest Steel Corp., Pittsburgh, was elected president of ISIS for 1956. Other officers are Myron L. Chase, Luntz Iron & Steel Co., Canton, first vice-president; Milton K. Mahler, Morrow Steel Co., Detroit, second vice-president; E. J. Moskowitz, Schiavone-Bonomo Corp., Jersey City, treasurer; Harry Marley, Abe Cooper-Syracuse, Inc., Syracuse, N. Y., secretary; and S. G. Keywell, S. G. Keywell Co., Detroit, treasurer emeritus.

There was less concern about volume holding up well. Good demand is assured through probability of high steel and foundry operating rates through 1956. But, as was so well demonstrated in 1953, it is possible for scrap prices to be depressed in a year of general business prosperity. And the industry as a whole fears a sharply dropping market more than all else.

As voiced by one major broker, there are three factors that could lead to this much-feared price break. They are (1) serious labor trouble in the steel industry which could lead to a strike, (2) any general widespread withdrawal from the market by major mills, and (3) export trouble.

E. C. Barringer, executive vice president of the institute, estimates that 34 million tons of purchased scrap (including industrial scrap) were generated for domestic consumption and about 4¼ million tons for export. This total exceeds that for any previous year by at least 10 pct.

The Institute has argued

against efforts by some groups to curb scrap exports, asserting that scrap should receive equal treatment with all metallics.

"If there was any emergency, present or threatened," said outgoing president D. C. Holub, "which should necessitate retention of scrap at home, then the scrap industry maintains that similar policy should govern the exportation of iron ore, pig iron and steel."

Mr. Barringer also stressed the fact that preservation of an open market for exports has benefited the scrap industry. For the record, it should be noted that D. H. Workman, executive vice president, Gray Iron Founders Society, remarked briefly as part of a general talk that most of his members viewed scrap exports with alarm.

Are Prices Too High?

Have scrap prices reached a peak? When they turn will they drift off or plummet sharply? Are brokers and dealers happy about current price levels? Much hinges on the answers to these questions.

Consensus was that prices had not reached their peak at the time of the meeting, that when they started down the drop would be sharp, and, finally, that many would like to see somewhat lower levels but don't relish the prospect of what happens on the way there.

Said Mr. Holub: "Just as the depressed markets of all 1953 and early 1954 were dangerous for our industry, so are the inflated levels of today distressing to our consumers. . . . At current levels the capital required to conduct only an average size business is disproportionate to the profit accruing from trading operations and the risk involved in a sudden downturn."

The Scrap Balance Sheet for 1956

■ CREDIT

**Continued strong demand
Record high prices
Strong export market**

■ DEBIT

**Possible steel strike
Danger of falling market
Threat of export controls**



IKE: No Time For Tax Cuts

President warns against heritage of debt going to future generations . . . But politically-minded Congress may cut personal rates anyway . . . Highway program is labeled urgent.

♦ IN HIS State of the Union message, President Eisenhower reminded Congress that the nation faces an outlook "bright with promise" in the next 12 months, but warned against tax reduction, slackened defense spending, and reduced foreign aid.

Mr. Eisenhower declared flatly that "we can never justify going further into debt to give ourselves a tax cut at the expense of our children."

Here are the key points of interest to business and industry in Mr. Eisenhower's message:

Taxes

Ike asked that all cuts be postponed in order to balance the budget and make a "modest" payment on the national debt of \$280 billion. Congress agrees that corporation and excise rates won't be cut, but hankers for a vote-catching cut in individual rates. Action not likely before spring.

Defense Spending

Short of war, the nation has never been better protected. But to keep the guard up means the Army, Navy, and Air Force will continue to call for a large share of the national budget "for the indefinite future." Congress agrees.

Foreign Aid

In order to remove the year-to-year anxiety of other nations that the flow of U. S. funds may some day stop, the Congress should put the foreign aid program on a permanent basis. Neither party likes this, but Ike will get most of what he asks.

Highways

Need for a large network of interstate highways is even more pressing than in 1955. Ike does not, as he did last year, ask for special-bond financing. Congress will vote a road program, probably financed largely through higher user taxes (gas, oil, tires, and tubes).

Flood Aid

Ike asks Congress to set up "an experimental program of flood damage indemnities" and to improve the laws for aiding disaster victims. Detailed recommendations will be unveiled later.

Labor

Congress is asked again to rewrite the Taft-Hartley law, and to broaden the Federal wage-hour law so as to make the \$1 Federal minimum wage apply to workers not now covered. Plenty of debate coming on each point, but doubtful if Ike will achieve either in 1956.

Health

The Government should cushion the high cost of illness with a program of reinsurance or other means to be determined by the Congress. Voluntary health plans should be encouraged and extended to many more persons, especially older persons. Many congressmen still opposed to this move. Action not likely.

Farmers

Ike asks a new attack on the problem of surpluses and establishment of a "soil bank" plan

under which Washington would pay farmers to divert lands from crops to "reserve."

Social Security

Extension of the plan to more workers is proposed. Something will have to be done to pull the premiums up in line with benefit payments. Congress agrees, but would rather duck the problem this year.

Picture shows President with White House assistant Kevin McCann at work on message of State of the Union.

Ike Takes The Nation's Pulse

BUSINESS AND INDUSTRY: thriving.

DEFENSES: must be kept strong.

TAXES: no cuts now; maybe later.

FEDERAL BUDGET: virtually balanced.

FARMERS: less acreage, via "soil bank."

ROADS: big interstate plan urged.

DISASTERS: Federal aid coming up.

SCHOOLS: 5-year program on the way.

SOCIAL SECURITY: broader plan asked.

HEALTH: Government may re-insure against ills.

WAGES: ask rise for lower brackets.

MOVIES: Why Go Hollywood?

Industry films can be made inexpensively . . . Magnetic sound track gives film flexibility at low cost . . . Movies can be used for sales, safety promotion, or varied technical subjects—By F. J. Starin.

♦ **FEEL THE NEED** of a company movie to promote sales or safety? To describe your product?

The cost may not be as high as you fear.

Development of the magnetic soundtrack for motion pictures has brought the industrial movie within reach of small companies.

What It Costs

You can set up a department fully equipped to shoot and show good industrial movies for as little as \$1500, including camera, lights and supplementary equipment; plus the salary of a staff photographer.

Each 1000-ft film will then cost about \$325 including film, props and sound stripping.

Or you can invest as little as \$850 for projection-sound equipment and hire a professional freelance photographer at a cost per picture from \$400 for a short strip to \$1500 for an average length feature.

Ben Pearson Co., Pine Bluff, Ark., manufacturers of heavy cotton picking machinery hired a local professional to shoot "Picking Cotton the Modern Way." Script was prepared by sales manager C. J. Wood. Cost was kept very low.

The single film is used to help establish new dealers, acquaint present dealers with equipment performance, educate company field personnel, and stimulate customer interest.

"Forging to .010 In. Tolerance" is an 800-ft-long film describing how the Arcturus Mfg Co., Venice, Calif., drop forges machine parts to precision tolerances on a production basis. Company president W. Sheehan had felt that such a film would be an effective sales tool, but estimates of the cost were well beyond the budget, until



COMPANY executive finds it easy to accurately add a narrative to the film soundtrack because the movie is projected at the same time by the same machine. Musical background to match action, voice will be added later.

magnetic soundtracks were developed.

Sheehan wrote the script and shot the movie using company personnel entirely. A print is in the library of the National Assn. of Drop Forgers & Stampers, Birmingham, England, and a special copy is being prepared with a German soundtrack.

Inexpensive Sound

Big advantage of the new system is that soundtracks can be erased and replaced in much the same manner as tapes for tape recorders. The narrative on a film can be changed any number of times so that one picture can do different jobs for different audiences. The sensitized magnetic

stripe which will receive and amplify the sound is applied to the finished film at a cost of 2½¢ per ft.

A single instrument will project the picture and record sound on the magnetic track. Cost of a good magnetic sound projector is \$719.

Having an original film professionally shot can be inexpensive or as costly as a budget allows. One photographer estimates he can turn out a top quality half-hour 16-mm full color motion picture for between \$1000-\$1500. One-day shooting project could cost as little as \$400.

The script may be developed by the advertising or sales department and narrated by a company executive or sales manager.

TUBES: You Can Blow Them Yourself

Revere process "builds" tubes into solid metal . . . New product being marketed in copper, brass, and aluminum . . . Manufacturing procedures studied for ferrous metals . . . Details pending—By G. G. Carr.

♦ **BLOWING** tubes into a solid strip of metal has been made possible by a new mill product put on the market this week by Revere Copper & Brass, Inc.

Called Tube-In Strip by Revere, the new product is a single strip or sheet of copper, brass, or aluminum in which tubes can be inflated in desired running lengths in a wide variety of shapes and sizes.

Revere is not anxious to reveal details of the process until final patents are granted (the process is now covered by patents pending), but THE IRON AGE has learned the following outline of the method used:

Position and dimensions of the tube sections are determined in advance, then incorporated into a casting by means of strips of friable material, chemically inert with respect to the metal being cast. After casting, the metal is rolled into strip of desired sizes. Revere emphasizes that, except for the expandable portions, the metal is a solid strip derived from a suitably treated casting and does not consist of two pieces of metal brazed, welded, or rolled together.

Variety of Shapes

Revere plans to ship its new product in uninflated condition to achieve the same freight savings possible from regular coils and sheets. The company stresses that inflation techniques are flexible and generally simple. Air pressure will often be entirely adequate for thin-walled tube, although hydraulic pressure will be required for most heavier walls.

Tube diameters can be varied within a single strip of metal—made all alike, or with adjacent

tubes of various sizes, or with one wall flattened. All tubes in a given width of strip can be inflated simultaneously or as desired. Free inflation produces a completely round tube. A profile die, or free inflation between flat plates, is used for other dimensions and contours.

Stamping, bending, forming and drawing operations can be performed before inflation, or the strip can be first inflated, then bent, perforated and further processed by common pipe and tube bending techniques.

Joining

Normal commercial joining techniques are readily applicable, Revere claims. Manifolds, for either series or parallel flow, are easily produced either before or after inflation, and return bends can be easily brazed, soldered or welded.

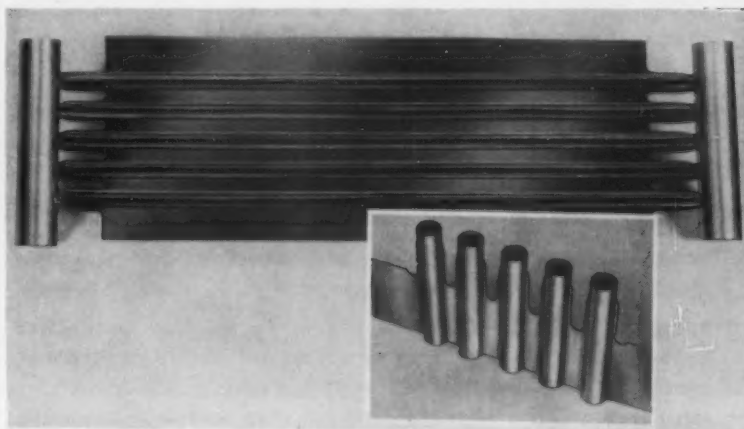
Revere will furnish Tube-In-Strip either in long coils or in flat cut sheets. Sheet widths now run

up to 16 in., and wider sizes are planned for the future. Limiting factor is the size of the casting billet from which the product is rolled to desired width or gage.

Economy Factor

Tube spacing can be generally at least as close as $\frac{1}{4}$ in., and closer in some instances. Distance between tubes is limited only by the width of the metal. Inside diameters of tubes when expanded can vary from about $\frac{3}{16}$ to $\frac{5}{8}$ in. Tube wall gage can vary from 0.0025 in. to whatever the inflation equipment permits.

While prices are higher for Tube-In-Strip than for sheet and strip of corresponding size, Revere believes the new product will bring substantial economies to users. First savings come from buying strip and tubing already fabricated together, rather than separate items, and further savings should be possible through new and improved designs.



WITH new Revere process the consumer would receive the center section of this manifold assembly in sheet form and would inflate the tubes of his own dimensions. Insert illustrates the quality of the results.

READY: Air Force, Industry Teamwork

New readiness policy to gear Air Force suppliers to speed up critical production at moment's notice . . . Program features increase in stockpiling at manufacturing sites—By R. M. Stroupe.

♦ **INDUSTRIAL** versatility will be the U. S. Air Force's key weapon in preparing for any retaliatory action which might be necessary in the case of an act of aggression against this country.

In such a case the decisive time to strike back will be within the first few hours. Producers of critical items must be able to turn out an unprecedented supply right from the very start despite any damage the enemy might have inflicted. Following this all-out effort in the initial phase, they may be able to gear down to normal top-speed production. But there will be no buffer time period for planning and hasty rescheduling.

Thus the Air Force is setting up a new two-fold production readiness policy which will be

able to answer needs of either a local war like the Korean conflict or a general all out world war.

A great deal of the potential success of the program will depend on setting up of a flexible network of suppliers. The Air Force has announced that it will contract for at least two producers of every top priority item. Selection will be based on the Defense Dept. industrial dispersal policy. At least one producer will be away from congested industrial areas and major military installations whenever possible.

ABC's of Priority

Priority will be awarded equipment in one of three categories. Category A or top priority will be weapons and support equipment

most urgently needed for aerial warfare. These must be kept moving to combat units at all times even under the most rigorous production conditions.

Items considered slightly less essential will be awarded Category B priority. These will be kept in production under conditions of industrial hardship. In extreme emergencies capacity to turn them out may be shifted to support Category A.

Remaining equipment will be classified in Category C. These will not be produced in a general war if industrial damage is severe. Capacity will then back up the higher priority categories.

Requirements for first line weapons are now being reviewed by Air Force Secretary Quarles. Items sure to be given top priority are long range bombers and intercontinental missiles.

Rapid speed-ups in production will be facilitated by an increase in stockpiling of basic and semi-finished materials at plant sites. Airframe builders, for instance, would stock metal bar, plate, extrusions, wire and forgings in large enough quantities to fulfill existing contracts.

Plan Flexible Workweek

Producers now operating single shift would be required to set up their personnel and administrative procedures to facilitate an immediate expansion of the work week to 60, 70 or 80 hours.

And manufacturers must be able to get along without additional workers or government provided machinery for 60 to 90 days of stepped up production.

Included in the system will be a number of forward speeds in addition to reverse.

■ What The New Air Force Plan Means to Defense Equipment Contractors

- ☐ **CONTRACT DISPERSAL**—Establishment of at least two supply sources for weapons and supporting gear when possible.
- ☐ **PRIORITIES**—Concentration on weapons and components needed in the first stages of a war.
- ☐ **CAPACITY**—Readiness to switch production capacity from low priority items to high priority equipment.
- ☐ **STOCKPILING**—Increased stocking of material at plant sites.
- ☐ **WORK WEEK**—Preparation for an immediate shift from the standard 40-hour work week to as high as 80 hours, if needed.
- ☐ **PRODUCTION SCHEDULE**—Flexibility to increase production to the degree the emergency demands, and ability to return to peacetime schedule at cessation of hostilities.
- ☐ **NEW CONSTRUCTION**—Emphasis on dispersal in construction of new plants.
- ☐ **COOPERATION**—Closer liaison between Air Force and industry for exchange of information on industrial readiness.

Ships:

Credit program means 20 new tankers and liners.

Government credit to enable ship operators to replace obsolete merchant vessels with new ones is being spaced so as to allow shipyards a basic program of approximately 20 new noncombat vessels a year.

In addition, says Federal Maritime Administrator Morse, development of efficient ore-oil carriers should mean further business for the yards, many of which have had barely enough work to stay in operation. The carriers would move iron ore on the Great Lakes until the lakes freeze and then shift to the oil trade.

Construction and conversion projects now going on in U. S. shipyards are valued at well over \$200 million (THE IRON AGE, Dec. 22, p. 38). Another \$300 million worth of work may be started, Mr. Morse forecasts, before June 30. Seven new merchant ships costing \$60 million were delivered in 1955.

Grace Adds Two

Projects currently underway include construction of four passenger ships, seven large tankers, and 11 merchant naval auxiliaries. Four Liberty ships are being converted experimentally to use new propulsion equipment.

Early this year, approval is expected for the building of two Grace Line passenger ships. Pan-Atlantic Steamship Corp. intends to order construction of seven trailerships during the year. These two projects, says Mr. Morse, represent about \$100 million in contracts.

He also calls attention to continuing requirements for repair of vessels in the reserve merchant fleet. About 310 contracts calling for \$10.7 million worth of modernization of these ships were placed in 1955.

Plan Atomic Engine

Exhaustive tests are in store for a prototype atomic aircraft engine.

Comprising a compact nuclear reactor connected to an engine, the prototype was built by the General Electric Co. at Evandale,

Ohio. It is to be put through its paces at the AEC national reactor test station at Arco, Ida.

Certain tests of the moving parts, such as pumps and compressors, reportedly have been given the engine apparatus at Evandale. Complete experiments at the AEC facility may go on for months before an atomic engine is ready for mounting in an airplane.

Problems involved in shielding a plane crew from atomic radiation must be solved before the engine is used to propel an airplane. Unofficial estimates place the actual flying of a U. S.-built atomic aircraft at some time in 1958 or 1959.

Navy Studies Turbine

A powerful new gas turbine engine, which is expected to perform a variety of jobs for the Navy, is now running on a test stand in San Diego.

Solar Aircraft Corp. developed the T-522 engine, designed to produce 500 hp, though it weighs only 1000 lb. Its weight is only one-fourth that of a conventional internal combustion engine of similar power, says the Navy.

This variable-speed engine is to be evaluated next in a 40-ft per-

DEFENSE

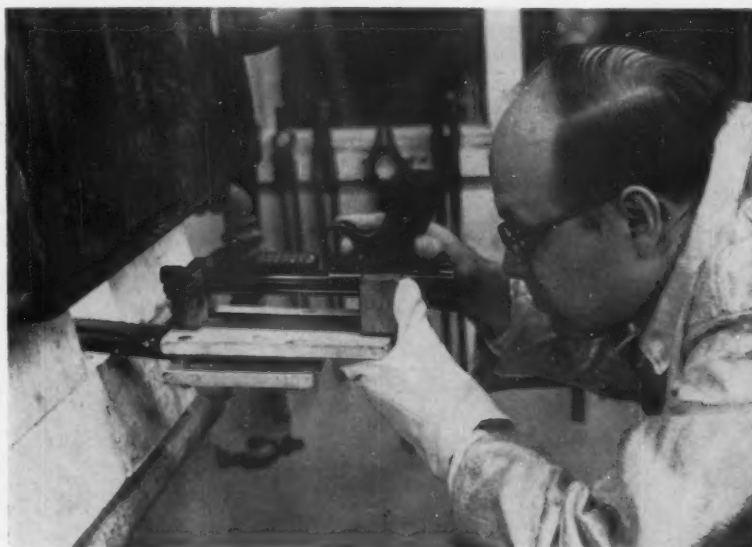
sonnel boat. It has potential use as a generator or a propulsion-drive engine. An older gas turbine engine familiar to the Navy powers generators on a new type of mine-sweeping craft.

The T-522 is adaptable to a number of fuels, has a low noise level, is reliable at both normal and very low temperatures, and is easy to maintain. Information gained through experiments with it will help the Navy determine what other uses may be found for gas turbine engines in adaptations for the fleet.

Test One-Man 'Copter

Foot soldiers can become airborne quickly and move to their jobs in commuter style if the Army adopts an experimental one-man helicopter called an "aerocycle."

Tactical tests are to be given 12 aerocycles built by DeLackner Helicopter, Inc., Mount Vernon, N. Y. In initial experiments at Camp Kilmer, N. J., soldiers without previous flying experience operated the machine successfully after only 20 minutes of training.



AIR-OPERATED BB GUN fired by Westinghouse materials engineer tests pellet effect on Inconel-coated jet plane turbine blade. Idea is to see whether coating can withstand cracking without oxidizing molybdenum blade. So far, the thin coating is showing up well in test.

STEEL:

**Detroit, Eastern start '56
with expansion plans.**

Detroit Steel Corp. will spend \$7 million in 1956 to improve and expand steelmaking at the Portsmouth, Ohio, plant.

Eastern Stainless Steel Corp., Baltimore, Md., is arranging for installation of a new type rolling mill and supporting equipment.

In both cases, the expanded capacity goals are based on confidence in a continued increase in consumer demand.

Detroit Steel has already put No. 1 blast furnace back into operation after a complete rebuilding at a cost of about \$1.25 million. This will boost annual capacity by about 264,000 tons.

Plans are now in the works for installation of a new openhearth furnace with a rated capacity of 275 tons.

The program will increase Detroit's basic steel capacity by 12 pct to 1.45 million net tons.

The new Eastern installation will boost stainless steel sheet capacity by about 50 pct. Emphasis will be on thinner gage sheet.

In terms of dollar volume, additional revenue will be in the neighborhood of \$15-\$20 million per year.

Expanding Gas Output

Air Reduction Sales Co., a division of Air Reduction Co., Inc., makers of industrial gases, intends to spend \$16 million in 1956 in an expansion program calling for construction of three new plants and improvements of existing facilities. The latest expenditure brings total spending for expansion over the last six years to about \$50 million.

A new plant will be constructed at Chicago to produce liquid oxygen, nitrogen and argon. It is

scheduled for completion late in 1956.

A new plant at Alton, Ill., will be in operation by the middle of 1956.

Calvert City, Ky., will be the site of the third new installation. This will also be the third plant the company has erected in this city. The selection of the site was influenced by the proximity of the highly industrial areas of the Ohio Valley.

Additions will be made on the Butler, Pa., installations and Riverton, N. J. operation.

Expansion Briefs

The Trane Co., LaCrosse, Wis.; manufacturers of air conditioning and heating equipment; construction of a 65,000 sq ft engineering building; bids invited by early spring.

H. W. Loud Machine Works, Inc., Pomona, Calif.; manufacturer of aircraft assemblies; new building, six automatic duplicating type hydrotels, enlargement of tool and die department; cost \$700,000.

Eleonora Chemical Corp., Passaic, N. J.; new plant for production of polyvinyl chloride.

Baldwin-Lima-Hamilton Corp., Philadelphia; construction of a new plant for manufacturing some of the company's products; Waltham, Mass.

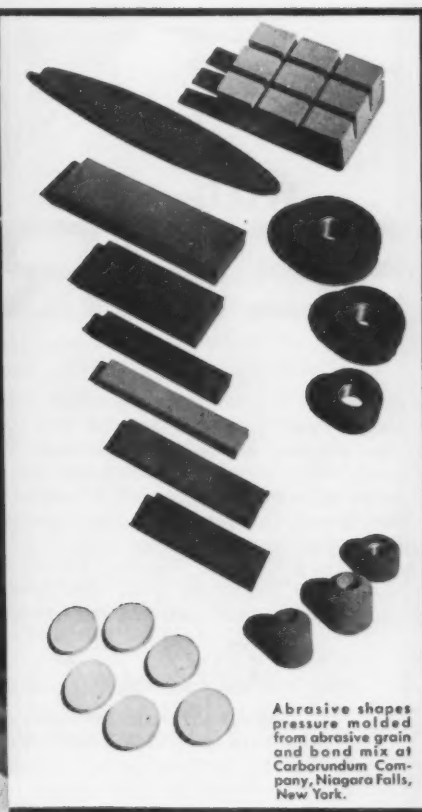
Kelsey-Hayes Wheel Co., Detroit, Mich.; new 100,000 sq ft addition to aircraft parts plant; Jackson, Mich.

Gilbraltar Steel Corp., Buffalo; installation of new equipment, construction of a new warehouse; cost \$400,000.



WORLD'S LARGEST band saw will cut any material up to 26 in. thick weighing not more than 10 tons along straight or contour lines. DoAll Co. product has mirror arrangement permitting operator to watch cutting.

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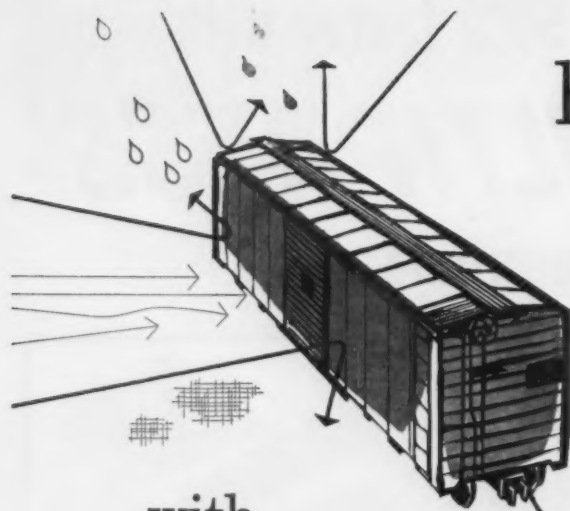
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REPORT TO MANAGEMENT

Without Even Fighting

If your company has a labor contract to negotiate this year, it may come as a shock to learn that you already have a 6¢ per hour handicap against you. This is because of the increasing number of workers covered by long term contracts that have annual pay increases written into them.

Supplementary unemployment benefits granted by the auto industry in 1955 tended to obscure the fact that the annual improvement factor was not only continued, but increased. The concept has widened to include more than 2,750,000 workers who will get automatic increases ranging from 6¢ to 11¢ per hour this year.

It will be your job to keep negotiations in their proper perspective. You don't have to do much forecasting to realize that your union will take improvement increases as the absolute minimum and will try to get more.

This doesn't necessarily have to work to your disadvantage, but chances are that it will. In only a few instances will a company be willing to concede 6¢ and take it from there.

Far Reaching Effects

It will long be argued whether the long term contracts with their built-in pay increases are beneficial or detrimental to industry as a whole. They have worked with the auto industry, where full effects of automation can be brought to bear to counteract steadily climbing costs of labor.

But other industries because of size or other factors, are unable to do so. They are at a disadvantage of being pressured to conform to a pattern that is not necessarily applicable to their own industry or operation.

Not everyone is like the

typical automotive manufacturing manager. Faced with a built-in 2½ pct pay increase each year, he must set a 2½ pct increase in efficiency as his minimum standard. But he has the facilities to do it.

It All Ties In

The need of increasing efficiency is in part responsible for the substantial capital goods outlay that industry plans this year. Increases in expenditures for new plants and equipment are expected to be the stabilizing factor in keeping the 1956 economy booming.

Planning for 1956

indicates a rate of about \$13.4 billion to be spent by manufacturers. That is—if the first quarter rate of spending is maintained. The U. S. Commerce Dept. predicts that, with some slackening, the total for the year will be \$11.3.

Durable goods manufacturers plan substantial increases. First quarter estimates are a full 25 pct over the 1955 rate of capital spending. Transportation equipment and nonferrous metals plan improvements and expenditures a full third over 1955.

Railroads will push for improvements more eagerly than any single segment of industry. Rate of spending for the first quarter will be 80 pct greater than the 1955 quarterly average.

How's Your Business Age?

If your business is more than seven years old, it's over average in age. That may be hard to believe, but the mortality rate in postwar years has been far greater than you imagined.

More than 60 pct of firms in business were acquired by present owners since World War II. The median age is seven. And 50 pct of firms acquired from other owners in the 1946-54 period were sold or liquidated within two years.

INDUSTRIAL BRIEFS

Defense . . . International Business Machine Corp. will construct a 400,000 sq ft engineering and manufacturing building at Oswego, New York. Three new buildings, total of 400,000 sq ft to house the company's new military products division.

Jet Power . . . Ryan Aeronautical Co. has been selected by Douglas Aircraft Co. to manufacture jet power packages for DC-8 four-engined commercial jet transports in an initial contract valued at approximately \$20 million. The jet pod contract from Douglas is expected to bring Ryan's backlog of undelivered business to more than \$50 million.

Prime Coat . . . U. S. Steel Corp. has awarded the prime contract to Surface Combustion Corp., Toledo, O., for a new continuous normalizing line for processing vitreous enameling stock at the rate of approximately 15 tons per hour to maximum temperatures of 1850 F, to be installed at the Irvin Works.

Screws . . . Voi-Shan Mfg. Co., Inc., Culver City, Calif., has been purchased by Pheoll Mfg. Co., Chicago, manufacturers of screws, nuts, bolts and special fasteners.

School Day . . . Federated Metals Div., American Smelting and Refining Co., has planned a one-day casting clinic on Jan. 25th at the Community Center, General Electric Co., Erie, Pa. This is the fifth in a series and is open to non-ferrous foundrymen located in western Pa. and western N. Y.

Merger . . . Pyrene Manufacturing Co. and its subsidiary, C-O-Two Fire Equipment Co. have merged and adopted the new name, Pyrene-C-O-Two Corp.

Tactical Studebaker . . . The first military truck built under a multi-million dollar government contract has rolled off the assembly lines of the Studebaker truck plant, South Bend, Ind. The 2½ ton tactical vehicle, marks Studebaker's re-entry into defense production after an absence of 18 months.

At Your Service . . . A Portland, Ore. branch office and warehouse has been opened by The Colson Corp., Elyria, O., manufacturers of wheel goods for institutions and industrial material handling equipment. The new installation will service Portland, western Oregon, and southwestern Washington.

Future of Industry . . . Dr. H. B. Linford, professor of Chemical Engineering, Columbia University has accepted a check for \$10,000 from Electro Metallurgical Co. to establish the F. M. Becket Memorial Award. Scholarships will be offered to students who have completed two or more years of study leading to a B.S. degree and are interested in the field of electrothermics.

Warehouse South . . . A new warehouse has been built to serve the South and Southwest area by Aeroquip Corp., in Dallas. Aeroquip makes flexible hose lines, detachable, reusable fittings and self-sealing couplings for farm, marine, aircraft and industrial applications.

Madison . . . Faessler Tool Co., Moberly, Mo., manufacturers of roller burnishing tools, has been purchased by Flightex Fabrics, Inc., Providence, R. I., and will operate as a subsidiary. As such, Faessler becomes part of the Madison group and will be known as the Madison-Faessler Tool Co.

Scholarship . . . Wheeling Steel Corp. has set up a tuition-refund plan which provides for a refund of tuition paid out by full-time employees who take evening or Saturday courses related to their work.

Subsidiary Dies . . . Pratt & Whitney Co., Inc., Hartford, Conn., has purchased the assets and business of the Sterling Die Co., Cleveland, O., manufacturers of thread rolling dies. Sterling will operate as the Sterling Die Div. of Pratt & Whitney.

Now Units . . . Baldwin-Lima-Hamilton Corp. has dissolved four wholly-owned subsidiaries, which have been operating as independent companies and integrated them into the organization as divisional units. Companies were Austin-Western Co., Aurora, Ill.; Hydropress, Inc., New York City; Pelton Water Wheel Co., San Francisco, and O. S. Peters Co., Washington, D. C.

Wheeled Salesman . . . Wilton Tool Mfg. Co., Inc., Schiller Park, Ill., has a mobile demonstration unit fully equipped with the company's products set up to stimulate actual plant operation. The unit is sent out through distributors.

Distributor . . . Forklifts, Inc., Harrisburg, Pa., has been appointed to sell and service the line of fork-lift trucks, straddle carriers and powered hand trucks produced by the Industrial Truck Div., Clark Equipment Co.

Slurry Pumps . . . Morris Machine Works, Baldwinville, N. Y., manufacturers of heavy duty slurry pumps, has named Cross Pump & Equipment Co., Charleston, W. Va., as its sales representative in the southern half of W. Va. and eastern Kentucky.

FACTS

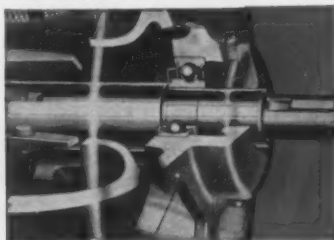
about

NEW DEPARTURE BALL BEARINGS

Self-sealed bearings simplify design...cut maintenance costs

New Departure originated self-sealed ball bearings to eliminate the most common causes of bearing wear and failure—such as abrasive dirt and improper lubrication. Since then, more than 300,000,000 New Departure sealed bearings have been produced in various types to fit the specific requirements of industry. Seals are available to keep out foreign matter, ranging from dust and dirt to corrosive gases... to retain lubricants, varying from heavy grease to light oil... to provide the protection that assures longest life.

New Departure's latest advance, Senti-Seal, embodies exclusive features which importantly improve both bearing performance and range of application. Because of its design, Senti-Seal provides controlled, highly efficient sealing with low torque and is not materially influenced by axial movement due to bearing end play within prescribed tolerances.

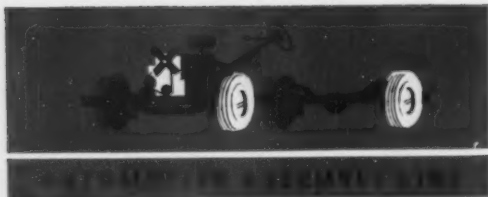


Sealed ball bearings offer the electric motor and machine tool builder many advantages. They simplify design, make it possible to mount motors in any position, cut maintenance to a minimum, and eliminate the need for relubrication for long periods of operation.

WRITE FOR COMPLETE INFORMATION ON
NEW DEPARTURE SEALED BEARINGS!

NEW DEPARTURE • DIVISION OF GENERAL MOTORS CORPORATION • BRISTOL, CONN.

January 12, 1956



Can Engineers Find That Low Look?

Inevitable design trend is to lower silhouette . . . New models will be lowest ever . . . Engineers face drive line problems . . . Result may be front wheel drive . . . Progress made on cooling problem—By T. L. Carry.

♦ JUST HOW LOW can the passenger car of the future get?

Automotive engineers have accepted the fact that demands of styling for a low silhouette will bring each successive new model closer and closer to the ground.

This is one of the principal conclusions to be drawn from papers, discussion, and just talk at the annual meeting this week in Detroit of the Society of Automotive Engineers.

For example, scattered among the extremely technical and complicated equations in a paper on drive lines is the implication that next year's cars are going to be much lower than any previous model year. The drive line is a key factor in lower design.

Inevitable Problems . . . R. R. Burkhalter and P. J. Mazzioti of the Dana Corp. take the assumption that recent styling considerations demand that cars be lowered. This places the obvious problem on the engineers to make that possible.

Lowering roof lines toward the seats has already reached a practical limit. The only other way to lower the car is to reduce the ground clearance. But here again there is a practical limit.

But this limit has not yet been reached and cars can be made to hug the road even closer by reducing the size of the wheels and dropping the engine and other mechanical parts closer to the ground. However, a reasonable

amount of space must be maintained to allow the car to clear ground obstacles and climb ramp angles without damaging the underside.

Disregarding the highly technical problems of modifying today's drive line systems, there are other ways of lowering the car. In fact, there are implications that the drive line will be eliminated eventually.

Front Wheel Drive . . . This can be done by installing a front wheel drive such as that on the GMC L'Universelle truck or by using a rear engine, rear wheel drive arrangement.

Some European cars use these systems, but their application to larger American autos requires a great deal of additional study. Growing trend to lower cars indicates that work in this direction is going on in more than one automaker's engineering department.

But for the present, engineers will have to be satisfied with modifying drive line systems until the public, or the automakers themselves, want to go as far as the basic change in design required by rear engine or front wheel drive.

Power Eater . . . The fan used to cool engines on autos and trucks has often been referred to by more than one engineer as a necessary evil. When you need it, you really need it. But when it is not necessary, the fan becomes a parasite which consumes horsepower that could be put to better use.

In this respect, automatic fan



LATEST Chevrolet Corvette "tops" previous models by offering two improved roofs; power-operated fabric and removable solid. Other new features include a restyled plastic body over a 225 hp V8 engine.

New process gives more corrosion-proof chromium finish

◆ Hard, wear-resistant Unichrome Crack-Free Chromium plated directly on steel stops rust . . . proves superior to ordinary chromium

◆ Improved non-galling, non-seizing finish achieved also with United Chromium's process

Chromium can now be plated without the network of fine cracks which occur in ordinary chromium more than a few ten thousandths of an inch thick. United Chromium has developed a solution for Crack-Free Chromium Deposits.

SALT SPRAYED 100 HOURS — NO CORROSION

Splined steel shafts used in washing machines were plated directly with chromium and then salt-spray tested by the manufacturer. With .0005" of ordinary chromium, the corrosive penetrated the cracks and shaft surfaces were completely covered with rust in less than 100 hours. With .0005" of Unichrome Crack-Free Chromium, surfaces were unblemished after 100 hours.

LONGER LIFE FINISHING

Unichrome Crack-Free Chromium is a gray matte plate, but buffs readily for high luster. It does not depend on scarce nickel for long life.

In other ways, too, the new finish proves superior to ordinary chromium. One user increased life of chromium plated dies 20% by switching to the new process. Another was able to take faster and deeper grinding cuts in plated cams and end the service failures encountered with ordinary chromium.

This is just one of many United Chromium developments in processes, equipment and materials which provide opportunities to cut your finishing costs . . . opportunities to turn out a better product through a better finish. We'd welcome the chance to work with you.



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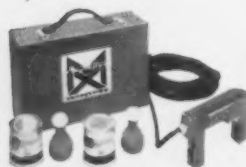
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The improved dye penetrant inspection with all materials in pressurized cans... A COMPLETE PORTABLE KIT FOR ONLY \$36.00. (Includes \$1.00 for prepaid parcel post—U.S.A. only, local or use tax extra.)

THE MAGNAFLUX Y-5 YOKE KIT



Permits inspection with Magnaflux for surface cracks of all types—quickly and with positive indications. Completely portable; operates from any 115 V. AC outlet, or from a 12-volt car battery. Ideal for off-the-road equipment, or for inspection difficult by other methods.

Note: A similar Kit, the Y-M 5 is also available. It contains Alnico permanent magnets, and requires no power source.

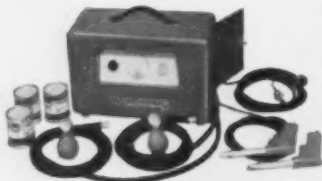


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MAGNAFLUX K-05 UNIT

Portable Magnaflux Kit, 500 ampere output, operates from 110 V. AC. May be used to hand inspect large or small magnetic parts, regardless of shape. Axles, spindles, and machine parts may be inspected without disassembly. Utilizes either Magnaglo or Magnaflux powders. Weighs less than 40 lbs., with cables.



MAGNAFLUX DRC-543 UNIT

Especially designed for low-cost and effective production inspection of parts and tools in high volume. Handles parts up to 54" long. Magnaglo hood permits use of the fastest wet alternating current method. Has motor driven 30-point demagnetizing switch and foot control for contact heads.



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Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Jan. 7, 1956	127,134*	20,340*
Dec. 31, 1955	108,356	13,762
Jan. 8, 1955	156,345	21,532
Jan. 1, 1955	129,514	18,922

*Estimated Source: Ward's Reports

controls have been developed which make it possible to drive the fan when cooling is required and allow it to turn freely when cooling is not necessary.

Three Types . . . There are three general types of automatic fans, electric, air and hydraulic. Each of these systems has three basic elements, a control, an actuating medium and a fan clutch.

The control element is placed in the engine coolant and acts through the actuating medium and the fan clutch to drive the fan when the coolant reaches a predetermined high temperature. It also releases the fan when the coolant reaches a predetermined low temperature.

The fuel economy realized and the extra power available for actually driving a vehicle reduces the operating costs of trip. Automatic fans are available on some trucks today but they are optional at extra cost.

Special Jobs:

Competitors try to steal Motorama thunder.

The GM Motorama, which opens in New York this month, is usually accompanied with such a blast of publicity that other auto producers are hard pressed to keep their names before the public.

In recent years, sly efforts have been made to see to it that GM doesn't get all the publicity.

The Chicago auto show, which precedes Motorama, is one means for other producers to display their wares to the best advantage.

Observation Seat

Chrysler is showing an experimental station wagon called the

Plainsman. It features a rear observation seat in which two passengers can ride backwards. Another innovation is a set of steps used to enter the rear seat. The steps disappear into the bumpers when the tailgate is closed. The rear seat unfolds and the tailgate opens and closes electrically. The spare tire is carried under the right rear fender panel.

Plymouth introduced a new model at the show—a 240-hp combination sports and passenger car called the Fury. Main feature of the car is its engine with a 303 cu in. displacement and a 9.25 to 1 compression ratio. Initial plans call for production of 5000 of the vehicles to capture a fair share of what Plymouth believes will be a growing market.

Turnpike Special

Ford's contribution to the show is an experimental car built by the Mercury Div. Called the X-M Turnpike Cruiser, the car was designed with the idea of taking advantage of new express highways now being built across the country.

The car is only 4.4 ft high and windows extend the length of the auto and wrap around the corners.

AUTOMOTIVE NEWS

Narrow metal pillars at the windshield and rear of the car are the only roof supports.

Packard, which is known for its innovations, is also showing an experimental model. This one is called the Predictor and is an electric-control, push-button automobile. It has provisions for such future advancements as radar control. The styling features include doors which swing into the roof and swivel-type front seats.

Not For Production

With the exception of Plymouth, none of these cars are production models. It is doubtful if any of them will ever be produced. Besides publicity attached to their introduction, producers watch the public reaction very closely for possible future use.

Specific features of the cars are more likely to be adopted in the near future. One such thing to watch for is the doors which swing into the roof. With cars becoming lower every year, this type of door takes on an added significance.

THE BULL OF THE WOODS

By J. R. Williams



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- good heat-treating properties
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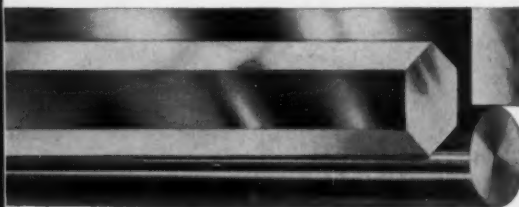
Jalcase was developed in J&L's metallurgical laboratories to meet the need for a free-cutting open-hearth steel with the mechanical properties required for high quality machined parts.

Today, specifications are standardized within the steel producing industry and S.A.E. and A.I.S.I. numbers have been assigned:

LOW CARBON GRADES		HIGH CARBON GRADES	
Jalcase Designation	A.I.S.I. Number	Jalcase Designation	A.I.S.I. Number
Jalcase—1	C-1113	Jalcase—7	C-1137
Jalcase—2	C-1114	Jalcase—8	C-1141
Jalcase—3	C-1116	Jalcase—9	C-1144
Jalcase—4	C-1117	Jalcase—10	C-1144
Jalcase—5	C-1118		specialty
Jalcase—6	C-1119		processed

And, J&L's Jalcase continues to maintain leadership in this group of steels.

J&L STEEL



When you specify "JALCASE," you can depend upon those qualities that help you obtain better production . . . longer tool life . . . lower overall costs. Remember to say "JALCASE" when you order.

Jones & Laughlin

STEEL CORPORATION — Pittsburgh

THE IRON AGE



Too Few Get Too Much, Says Congress

Defense Dept. buying policies draw strong blast . . . Congress says few contracts are let on open bids . . . Pentagon is told to reduce direct negotiations, broaden supply structure—By G. H. Baker.

♦ **ADVERTISED** calls for bids on government contracts are to increase in the months ahead. At the same time, you can expect to note a decrease in the number of privately negotiated contracts between the government and its defense suppliers.

This trend toward more advertised bids is coming at the insistence of Congress, not because the Defense Dept. is dissatisfied with its cozy system of dealing behind closed doors with favored contractors.

A new congressional examination of contracts let by the Defense Dept. since Charles Wilson took over as Secretary of Defense shows that 94.19 pct of the value of all contracts has been let as a result of direct negotiation with suppliers. In only 5.81 pct of the cases (dollar value) were contracts awarded as a result of advertised bids.

Want More Bids . . . Many congressmen hold that the percentage of bid contracts is far too small. They contend that the Defense Dept. is suppressing competition among prospective bidders; that it is not getting its money's worth because of its preference for "private" deals, and that many firms, particularly small outfits, in the market for defense work are frozen out of the picture because of the Pentagon's failure to advertise for bids.

Rep. Carl Vinson, the chairman of the influential House Armed Services Committee, says bluntly these percentages (5-95) should be reversed. The Pentagon, in

other words, ought to be buying about 95 pct of the value of its supplies via open bids, and only about 5 pct via the negotiated method.

Stray Too Far . . . On the Senate side of the Capitol, there is similar belief that the Pentagon has strayed too far from the path of free and open competition among bidders. The Senate Small Business Committee, for example, says it intends to do "everything possible" in 1956 to foster open bidding on contracts, and to slow down the "abuse" of the privilege to negotiate contracts.

Direct negotiation of contracts was never intended to apply to more than a handful of cases where bidding would not be feasible, such as purchase of aircraft

carriers. But under Mr. Wilson, the Defense Dept. has decided that it is not "feasible" to call for bids on 95 pct of its orders. Starting now, the Pentagon is going to have to change its ways.

Labor Law Stays . . . President Eisenhower confides to congressional leaders that he hasn't much hope of seeing the Taft-Hartley labor law rewritten in 1956. But he adds that he will repeat his recommendations to Congress for an overhaul of the controversial nine-year-old law.

Mr. Eisenhower has asked Congress repeatedly to remove what the White House calls the "union-busting" features of the law, but a coalition of Southern Democrats and Republicans has pigeonholed

Where Labor Votes Would Go

■ **AFL Machinists** asked 151 AFL-CIO executives which Republican and which Democratic candidates would draw strongest labor support. Poll assumed President Eisenhower would not be a candidate for re-election. Here's what labor chiefs think:

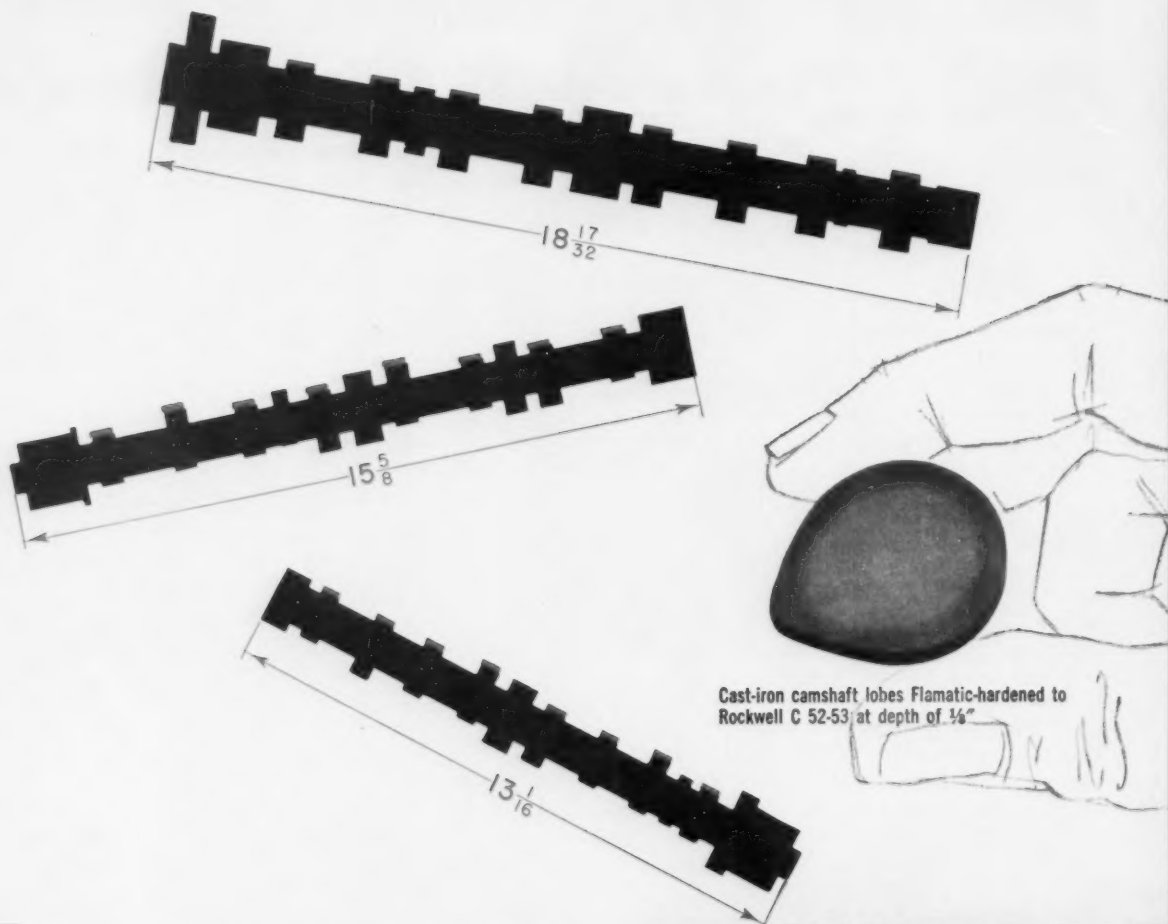
REPUBLICAN

Chief Justice Earl Warren	74 pct
Gov. Goodwin J. Knight of Calif.	15 pct
Scattered*	5 pct
No opinion	6 pct
*Among Harold Stassen, Richard Nixon, Governor Hall, Senator Knowland.	

DEMOCRATIC

Adlai Stevenson of Ill.	62 pct
Gov. Averell Harriman of N. Y.	14 pct
Sen. Estes Kefauver of Tenn.	14 pct
Gov. Mennen Williams of Mich.	6 pct.
Sen. Stuart Symington of Mo.	3 pct
No opinion	1 pct

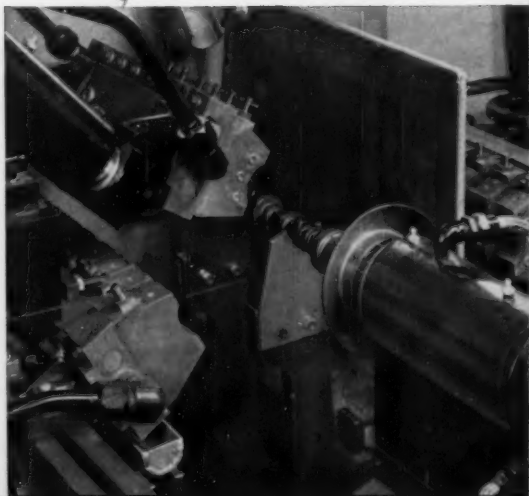
1 flamatic hardens 3 different camshafts



Cast-iron camshaft lobes Flamatic-hardened to Rockwell C 52-53 at depth of $\frac{1}{16}$ "

THE drawings above show the three camshafts that a large automotive manufacturer asked Flamatic to harden selectively on a single machine. The close-up at the right shows how Flamatic flame hardening solved the problem through simple, ingenious tooling. The machine achieves high production, yet set-up changes take less than 15 minutes. The operator positions the water-cooled shield, sets the selector-switch for the proper flame head, and adjusts the work-holding fixture. The cycle is then automatic except for loading.

This is another case out of hundreds showing how Flamatic selective hardening provides rapid heating and precise temperature control which results in high production and uniform performance over a wide range of parts. Write for Catalog No. M-1861, or send us part prints for analysis.



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CINCINNATI 9, OHIO, U.S.A.

the requests each year.

Congressional leaders agree with Mr. Eisenhower that the Congress hasn't changed its mind on the Taft-Hartley law. One prominent Republican declares that if the Taft-Hartley law is ever repealed, the unions will have to develop "another whipping boy."

About 40 bills to rewrite Taft-Hartley are pending before congressional committees. But many of these bills call for a strengthening of the law, so lobbyists for the unions are not pushing the demands for committee action too hard.

Rates:

ICC sees danger in proposal for eased controls.

Surface carrier competition may become too free, the Interstate Commerce Commission protests, if the Eisenhower Administration achieves its proposed changes in the national transportation policy.

The ICC is apprehensive about the possible loss of some of its regulatory authority, particularly in the rate-making field. It fears its powers would be considerably weakened if certain recommendations made last spring by a special Cabinet committee headed by Commerce Secretary Weeks become law.

Bills to implement these recommendations were introduced in Congress before midyear and are awaiting action by the House and Senate Commerce committees. ICC now has detailed its opposition in a lengthy "analysis" of the bills.

Gist of the agency's complaint is that the bills go to excessive lengths in relaxing government regulation of transportation. ICC suggests there is danger of unbridled competition.

The Cabinet committee, on the other hand, says it is urging establishment of a more equitable rate structure which would benefit both small and large shippers.

Setting of actual rates within prescribed ceiling and floor limits would become the work of the carriers, rather than the ICC.

Probe Air Pollution

Four research studies of ways to curb air pollution will be started by the U. S. Bureau of Mines before next June 30.

By agreement with the U. S. Public Health Service, the Bureau will investigate air contamination and its control in industrial and automotive vehicle operations. Public Health Service provides \$98,000 to cover costs of the Bureau's work.

In Pittsburgh, engineers and chemists will seek better methods of designing and using industrial and municipal incinerators. Special attention will be given to the problem of inefficient burning of waste.

At the same city, the Bureau is to make an engineering survey to find the most effective low-cost means of removing harmful sulfur dioxide from stack gases at furnaces and processing plants. As a separate but related project, the Bureau will cooperate with the PHS in getting and analyzing industrial plant stack samples.

Researchers at the Bureau's petroleum experiment station, Bartlesville, Okla., will look into air contamination by various oils and gases used in cars and other vehicles. This study is to supply information on techniques for eliminating or reducing undesirable effects of exhaust gases.

WASHINGTON NEWS

Chairman Bars Change

Business arguments apparently have rung the bell with the chief counsel of the Senate Antimonopoly subcommittee, Paul W. Burns.

But subcommittee chairman, Sen. Harley M. Kilgore, D., W. Va., still favors strict application of existing laws banning American firms from entering into cartels or agreement between firms in different countries. The Senator has the final word.

Businessmen have also failed to convince the Eisenhower Administration that greater freedom to join manufacturing and marketing practices of foreign countries would be a good thing.

Witnesses from the Departments of State and Commerce say the American policy of insisting on completely free competition—without cartels or agreements—has contributed to the "respect with which American industry is regarded abroad."

It has also been a factor in frustrating international cartels because no cartel can get a grip on an international market if American firms with their huge productive capacity refuse or are not permitted to join.

There'll Be No Place Like Home

■ By 1975, the American home will be practically dusttight, pollen free, and destruction proof. It will be heated and air conditioned by solar energy, the National Association of Manufacturers predicts.

■ Two decades from now, homes will be roomier, more comfortable, and easier to clean and maintain. Kitchens will be completely automatic with cookers that make meals in minutes and washers that clean dishes in seconds.

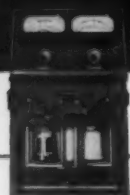
■ All interior walls will be

movable and interior color schemes would be quickly changed by lighting effects, with radio, television and hi-fi piped to every room. Lights will be centrally controlled and the entire house will be locked with a central key.

■ The forecast sounds bad for paint makers and the key cutting business. But there's little doubt that when these innovations come to pass, hardware stores will be stocking most of them—and maybe hiring physicists and other scientists.

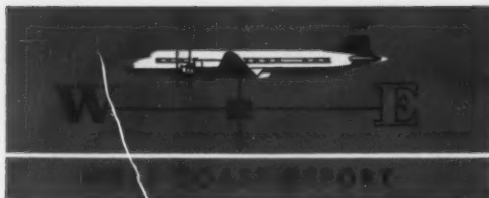
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THE PORTABLE HEAT PROVER is supplied and maintained free by Cities Service. It helps control combustion efficiency by allowing rapid, continuous sampling, simultaneous readings and direct measurement of oxygen and combustibles. Inland uses the Heat Prover for its blast furnaces, open hearths, soaking pits, continuous galvanizing line, reheat furnaces, purging operations, annealers, and boilers on ore ships.

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Floods Do Little Industrial Damage

Northern California flood destruction hit hardest at home and farm areas . . . Most Coast industries escape unscathed . . . Major steel producers see banner year ahead . . . Northwest growth drops—By R. R. Kay.

♦ **INDUSTRIAL DAMAGE** from the Northern California flood was just about nil. The hardest hit areas were chiefly agricultural and residential. This is in sharp contrast to the New England floods of last year where industrial losses reached staggering totals.

"Only service type industries, primarily those that cater to agriculture, were hit by the California flood," Col. William F. Cassidy, chief engineer, South Pacific Div. of the U. S. Corps of Engineers, told **THE IRON AGE**.

Col. Cassidy, who made first hand inspections of the flood-damaged regions, says neither his on-the-spot surveys nor reports that have been seeping into his office in San Francisco indicate any important destruction to industry.

Industry Little Affected . . . Justin A. Mace, chief of the Corps of Engineers technical liaison branch, agrees with the colonel's appraisal. Mr. Mace, who spent two months studying last year's New England flood damage, points out the big difference between the two disasters: in the East, industry suffered enormous losses; in the West, industry was little affected.

Even the light industry that abounds on the San Francisco Peninsula was spared. Although numerous residential areas were knee deep in water, the electronic and other Peninsula plants remained high and dry.

Look For Prosperous Year . . . Farwestern steelmakers fully expect 1956 to be a year of cloudless

prosperity. Big problem: How to satisfy the insatiable steel demand from the area's expanding economy? Answer: More capacity. Here's what the major mills are doing about it:

Columbia-Geneva Div., U. S. Steel Corp., will up steelmaking capacity 20 pct at its Geneva Works, Provo, Utah. It will boost present 1,879,000-ton capacity to 2,260,000 tons per year. They'll do it by enlarging each of the mill's 10 open hearths to 300-ton capacity, and by adding auxiliary equipment. President Alden G. Roach says 1955 production hit about 1.75 million tons.

Kaiser Steel Corp. is planning a multi-million-dollar expansion

of ingot capacity at its Fontana, Calif., works. Jack L. Ashby, vice president and general manager, reports 1955 production at 1,485,000 tons—up 16 pct from 1954.

Bethlehem Pacific Coast Steel Corp.'s President H. H. Fuller says, "Our present full rate of steel mill operations is expected to continue through early 1956."

Northwest Needs Promotion . . . Pacific Northwest needs some vigorous promotion if it wants to keep up its industrial development. The area's population growth has slowed down markedly. It gained 42 pct from 1940 to 1954, but this may slide to 15 pct by 1960, says one local official.



IN THE WAKE of Northern California's devastating floods, this National Guardsman protects homes and property against looters. High-level waters did little serious damage to local industrial areas.

Efficiency in Cutting-off is Important

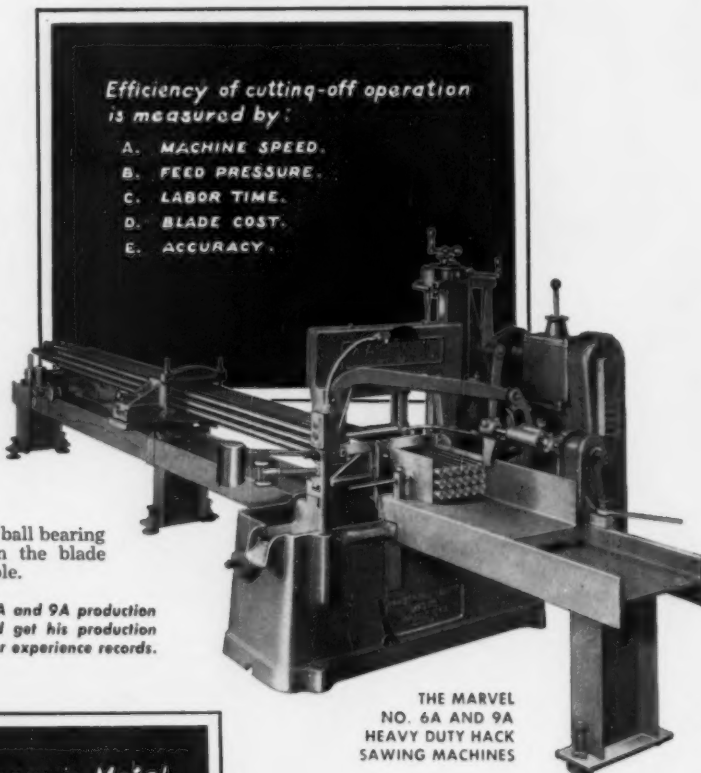
Practically all machining operations start with pieces cut-off from bars or billets. Hence, inefficiency, or lack of capacity, in the cut-off department can hold up or stagnate the entire plant.

- A. Are all-ball-bearing and provide a quick return; therefore they run **FASTER** than others on the same work.
- B. Can apply as much as 1200 pounds feed pressure—two to ten times as much as other hack saws and band saws.
- C. Are fully automatic, requiring no more operator attention than an automatic screw machine; and set-up for any bar size and cut-off length is extremely simple.
- D. Use a non-breakable high speed hack saw blade—the type of saw blade that produces the greatest number of square inches of metal cut per dollar of blade cost—two to ten times (or more) as much as any band saw.
- E. Because of their exceptional sturdiness, ball bearing reciprocating frame, ability to tension the blade "truly taut", their accuracy is dependable.

If you are not using modern, improved MARVEL NO. 6A and 9A production hack saws, call the local MARVEL Field Engineer and get his production and cost estimates on your work—to compare with your experience records.

Efficiency of cutting-off operation is measured by:

- A. MACHINE SPEED.
- B. FEED PRESSURE.
- C. LABOR TIME.
- D. BLADE COST.
- E. ACCURACY.



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SAWING MACHINES

Formula for Accuracy in Metal Sawing:

$$ACCURACY = \left(\frac{\text{Length}}{\text{Straightness} \times \text{Squareness}} \right)$$

$$\left(\frac{\text{Straightness}}{\text{Squareness}} \right) = \left(\frac{\text{Blade Rigidity}}{\text{Blade Tautness}} \right)$$



Write for catalog C-35—showing and describing eleven different series of Metal-Cutting Sawing Machines and MARVEL-High-Speed-Edge Hack Saw Blades and Hole Saws.

The composite MARVEL High-Speed-Edge Hack Saw Blade—cuts **any** machinable material efficiently. There is no time lost changing blades for different types of steel; no time lost replacing shattered blades, because MARVEL High-Speed-Edge Hack Saw Blades are positively **unbreakable**. These superior blades have the finest high speed steel cutting edge welded to a strong alloy steel body. They will stand-up under the highest speeds and heaviest feeds attainable on any make hack saw. Can be safely tensioned tauter than any other blade—cut-off not only straight but also square and with less stock loss.



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Have Tool Sales Entered New Era?

November order figures show spurt continuing . . . Builders wonder if upswing means new peacetime pattern . . . Lagging shipments add to fat backlogs . . . Will customers wait?—By E. J. Egan, Jr.

♦ **NEW ORDERS** for machine tools continue to pour in on U. S. builders at an undreamed of peacetime rate. November bookings for metal cutting and grinding equipment totaled an estimated \$128 million as compared to \$102.7 million in October.

If the pace keeps up, builders might begin to wonder if they didn't really catch a bear by the tail when they put on their big Machine Tool Show in Chicago last September.

That event is given most of the credit for the present sales boom in metalworking machinery. But it's also a hard fact that monthly shipments, even though they crept up to a \$70.7 million total in November, are still far below the new order rate.

Backlog Grows . . . Inevitable result of this situation is that backlogs keep stretching out. In the latest industrywide estimate National Machine Tool Builders Assn. figures it would take seven months to work off all unfilled orders at the current production rate. Big question: How long before the thought of long delayed deliveries might start discouraging prospects?

Many builders share the optimistic view that prospects might even be more inclined to jump on the new order bandwagon than to drop off as the crowd grows. This thinking is based on the assumption that many buyers haven't much choice.

Reason is that tough competition is really putting the squeeze on inefficient metalworking shops. They modernize or they're dead.

Spurt Startles . . . Whatever is behind it, the boom in machine tool sales in the past few months is literally amazing. Monthly new order totals of \$100 million or more for cutting tools were not unknown heretofore, but they showed up only during wartime.

And between wars, new machine tool orders weren't the easiest things to come by. From the end of World War II to the beginning

of the Korean emergency, the peak new order month was April, 1946, with a total of \$36.5 million. Low point for the same period was July, 1949, when new orders touched bottom at \$14.2 million.

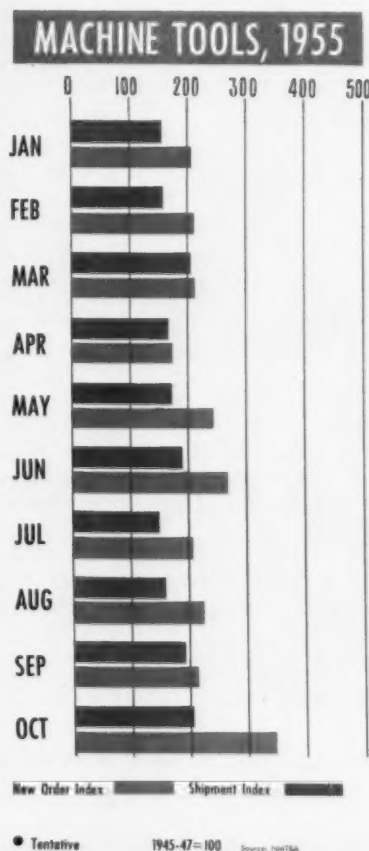
After Korea, and until the Machine Tool Show last September, new orders followed the traditional peacetime pattern. They meandered up and down from month to month, although on a slightly higher dollar level than in former years.

Top Previous High . . . Best post-Korean month was June, 1955, with a \$77.8 million total; worst month for the period was November, 1954, with only \$35.4 million reported.

Right now it looks as if the Show last September might have triggered a whole new dollar-level area for peacetime sales of metal cutting tools. That doesn't mean that monthly new order totals will consistently stay above the \$100 million mark, but it does seem unlikely that they'll drift down to the \$20 million or \$30 million area in the foreseeable future.

London Show Set . . . The International Machine Tool Exhibition will be held in London, England, from June 22 to July 6, this year. Products of a number of U. S. builders will be displayed in the total of 300 exhibits.

Greatest number of exhibitors will be builders from Britain, West Germany, France, and other Free European nations. Word is that every square inch of display space at London's huge Olympia site is already spoken for.



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The Iron Age

SALUTES

Ernest V. Gent For 20 years he has been helping the zinc industry by spreading useful information and bringing people together for useful work. He is a precise worker and a skilled diplomat.

American Zinc Institute has been promoting the use of zinc for the past 37 years, putting out technical and market information, preaching the metal's advantages far and wide.

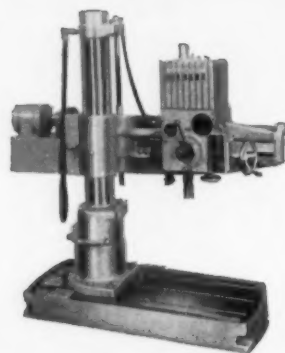
Much of the Institute's effectiveness can be traced to Ernest Gent, who has been sparking activity for the past 20 years. A trim, erect man, Mr. Gent has the precision for reliable dissemination of technical data. He gathers facts carefully, analyses them with ironclad concentration. At the same time, he has the manner of a diplomat, is always willing to listen to the other fellow's story. In 1953, the Galvanizers Committee presented him with its annual award for distinguished service. Last year, the committee elected him an honorary member for life.

It's no accident that Mr. Gent works well with an entire industry. He has the broad background to meet a wide variety of situations. He was born in England, came to this country in 1907, and went to work in New York as an office boy. In 1911, he joined the sales department of

the Hooker Electrochemical Co. Four years later he became junior member of the firm of Bush, Beach and Gent. The company acted as sales agents for chemical concerns, pioneered expansion of chemical export markets.

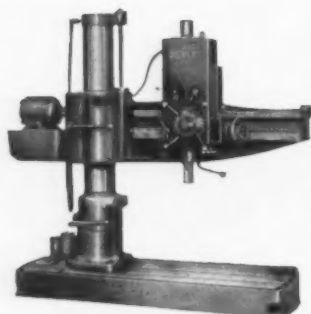
In 1925, after dissolution of the partnership, he was appointed manager of the Zinc Export Assn., organized to export slab zinc. In 1935, he joined the American Zinc Institute as Secretary. In this role, he has brought different segments of the industry closer together; he has improved relations between zinc producers and their principal consumers, galvanized product producers of the steel industry. His efforts led to formation of the Galvanizers Committee, sponsored by the Institute, which has operated since 1936.

In 1941, Mr. Gent was called to Washington to serve as special consultant for defense production. In 1948, he was named executive vice president of the Institute. He is stepping down from full-time activities there this year but will serve as a consultant.



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Now, for the first time, you can gain the advantages of hardened columns on radial drilling machines with 9" and 11" columns. Because they resist scoring and hold dimensional accuracy under most extreme conditions, these new columns may well add years of service to our machines.

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 3366 Beekman St., Cincinnati 23, Ohio

A 3' arm 9" column radial can be purchased for as little as \$1100 down and \$80.67 a month for five years. Includes 6% simple interest (or about 3% add-on).

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The Iron Age INTRODUCES

Jack C. Lucas, appointed executive vice president, **Ross-Meehan Foundries**, Chattanooga, Tenn.

Dr. John T. Burwell, Jr., appointed vice president, **Horizons Inc.**, Cleveland.

J. C. Douglas, appointed vice president, **Electro Metallurgical Co.**, New York.

L. F. A. Mitchell, elected vice president, **Burns and Roe, Inc.**, New York.

A. J. DeWolf, elected president and treasurer, **Dreis & Krump Manufacturing Co.**, Chicago; Edward J. Dreis, named first vice president; Matt Krump, named second vice president; Gert Winkler, named secretary; Margaret Freidhof, named assistant secretary.

Charles V. Boulton, elected treasurer, **IBM Corp.**, New York; Harry M. Sibley, named controller.

Robert W. Farren, appointed executive assistant to president, **The de Silvey Corp.**, East Aurora, N. Y.

Chester D. Rugen, appointed assistant vice president, engineering, **Universal Atlas Cement Co.**, New York; Robert B. Jordan, appointed chief engineer.

Harold A. Stipek, named superintendent, Steel Div., **The Stanley Works**, New Britain, Conn.

Paul C. Meyer, elected vice president, **Henry J. Kaiser Co.**, Oakland, Calif.

John B. French, appointed manager, sheet product sales, **Columbia-Geneva Div., U. S. Steel Corp.**, San Francisco.

Douglas S. Brown, appointed sales manager, **Daubert Chemical Co.**, Chicago.

Arthur V. Baumann, Jr., named sales promotion manager, **The Lodge & Shipley Co.**, Cincinnati, O.

F. W. Neville, appointed purchasing manager, **The C. O. Bartlett & Snow Co.**, Cleveland.

William A. Stevens, appointed sales manager, **Union Steam Pump Co.**, Battle Creek, Mich.

Martin C. Butters, appointed general manager, **Butterfield Div., Union Twist Drill Co.**, Derby Line, Vt.; Stanley L. Holland, elected president, **Athol**, Mass.

Robert L. Wicker, appointed sales manager, **Federal Motor Truck Div., Napco Industries, Inc.**, Minneapolis.

John B. Guba, named assistant manager, sales, **Detroit, U. S. Steel Corp.**

Arthur S. Klopff, appointed manager, marketing, **American Gilsonite Co.**, Salt Lake City, Utah.

PERSONNEL



RICHARD C. BANNON, appointed vice president, sales, **Waterbury Farrel Foundry and Machine Co.**, Waterbury, Conn.



DONALD M. PATTISON, elected vice president, **The Motch & Merryweather Machinery Co.**, Cleveland, Ohio.



P. D. SHOLLAR, elected vice president and manager, **Procurement Dept., Koppers Co., Inc.**, Pittsburgh.



ROBERT R. MCCARTNEY, elected vice president, overseas operations, **Clark Bros. Co.**, Olean, N. Y.

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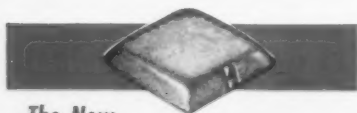
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John S. Hawley, named manager, Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., Buffalo; Edward Dattisman, named general superintendent, Buffalo plant.

Neil O. Johnson, named plant manager, Foote Mineral Co., Kings Mountain, N. C.

Thomas J. Symansic, appointed chief production engineer, Wheeling Steel Corp., Steubenville, Ohio; R. Q. Montgomery, appointed supervisor, orders, Customer Service Div., Wheeling Corrugating Co., Wheeling, W. Va.; J. W. Francy, appointed industrial engineer, Steubenville, Ohio.

Irving M. Malsch, appointed general sales manager, Bridgeport Brass Co., Bridgeport, Conn.; John C. Miller, appointed sales manager, mill products; Col. Orson A. Kinney, appointed manager, defense sales; Harry T. Jacobson, appointed general traffic manager.

D. J. Stoker, appointed division manager, North Pacific Div., Armco Drainage & Metal Products, Inc., Middletown, O.; Marvyn R. Ambuhl, appointed division sales manager.

Martin C. Falk, appointed chief research engineer, The Yoder Co., Cleveland, O.

Edward J. Cassidy, appointed director, quality control, Home Appliance Div., Servel, Inc., Evansville, Ind.

William L. Neilson, Jr., appointed general sales manager, Greenfield Tap and Die Corp., Greenfield, Mass.

H. E. Nelson, appointed regional manager, Detroit, National Automatic Tool Co., Richmond, Ind.

Samuel Gilman, named technical assistant to director, Consolidated Electrodynamics Corp., Pasadena, Calif.

William Howard Leggett, named sales engineer, Acheson Colloids Co., Rochester, New York.

PERSONNEL



GREY W. TRESSLER, elected vice president, manufacturing, Titan Metal Manufacturing Co., Bellefonte, Pa.



WILLIAM C. ETHEREDGE, appointed director, Price Div., U. S. Steel Corp., Pittsburgh.



BERNARD L. JONES, appointed chief engineer, Crucible Steel Co. of America, Pittsburgh.



DR. RICHARD N. RHODA, appointed head, research laboratory, Platinum Metals Section, International Nickel Co., Bayonne, N. J.

Running Ten Nuts at a Crack...

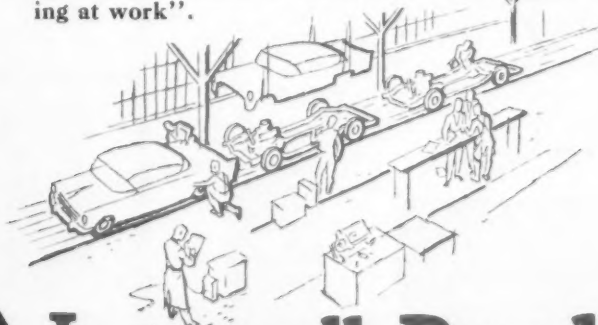
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This large auto manufacturer formerly used two $\frac{1}{4}$ ton presses to position a differential carrier in the rear axle housing. Then the ten $\frac{3}{8}$ " nuts were run individually. Only experienced operators could control torque so that it met specifications. Naturally the engineers wanted to eliminate the press operation and improve torque control.

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PERSONNEL

Robert Cushman, named assistant to sales manager, Grinding Wheels, Norton Co., Worcester, Mass.; Harry G. Brustlin, named district manager, West Coast; Donald F. Jones, appointed district manager, Pittsburgh.

Ben Kaufman, appointed general manager, Ajax Metal Div., H. Kramer & Co., Chicago.

Otto A. Dworak, named manager, Convair Fort Worth resident office, San Diego, Calif.

George C. Brecht, appointed general manager, sales, Greenville Steel Car Co., Greenville, Pa.; John T. Egbert, Jr., appointed assistant to general manager, sales; William A. Bright, Jr., appointed sales manager, ATECO Div.

A. Ralph Cooper, appointed mid-west regional sales manager, The Black & Decker Mfg. Co., Towson, Md.

Edward H. Bick, appointed merchandising manager, Willys Motors, Inc., Toledo, O.

F. D. Weatherholt, appointed manager, Gearing Div., Westinghouse Electric Corp., Pittsburgh, Pa.; L. R. Botsai, appointed assistant to vice president.

Walter A. St. Clair, appointed assistant sales manager, Eastern Industrial Truck Div., Hyster Co., Portland, Ore.

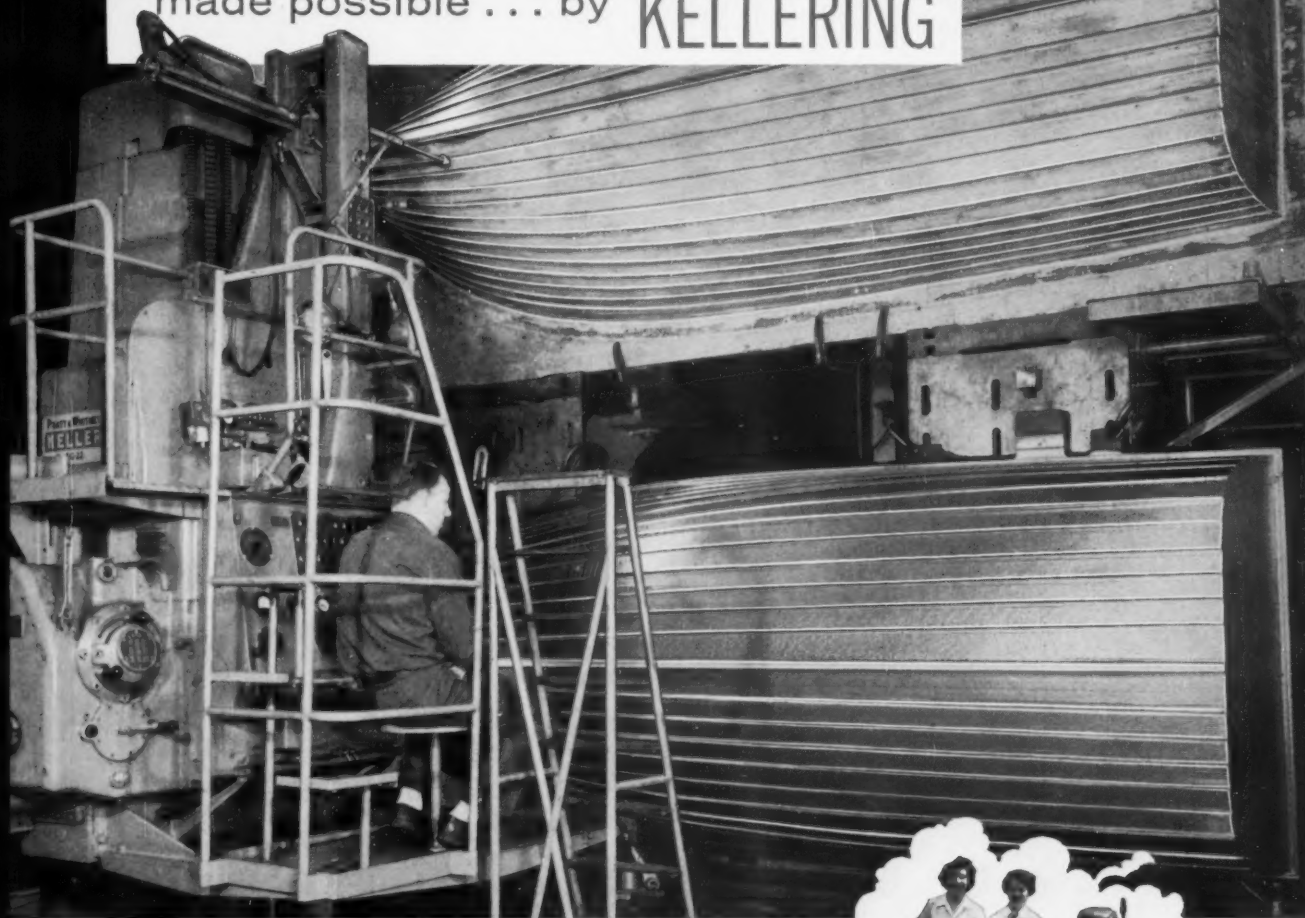
Thomas M. Macey, named manager, services, Stanford Research Institute, Southern California lab., Los Angeles.

Franklin A. Regener, appointed sales manager, Variety Stamping Corp., Cleveland, O.

C. S. Wagner, appointed manager, sales, Merchant Trade Products, Northwestern Steel & Wire Co., Sterling, Ill.

Fred Stricker, appointed manager, Canseal Dept., Cannon Electric Co., Los Angeles.

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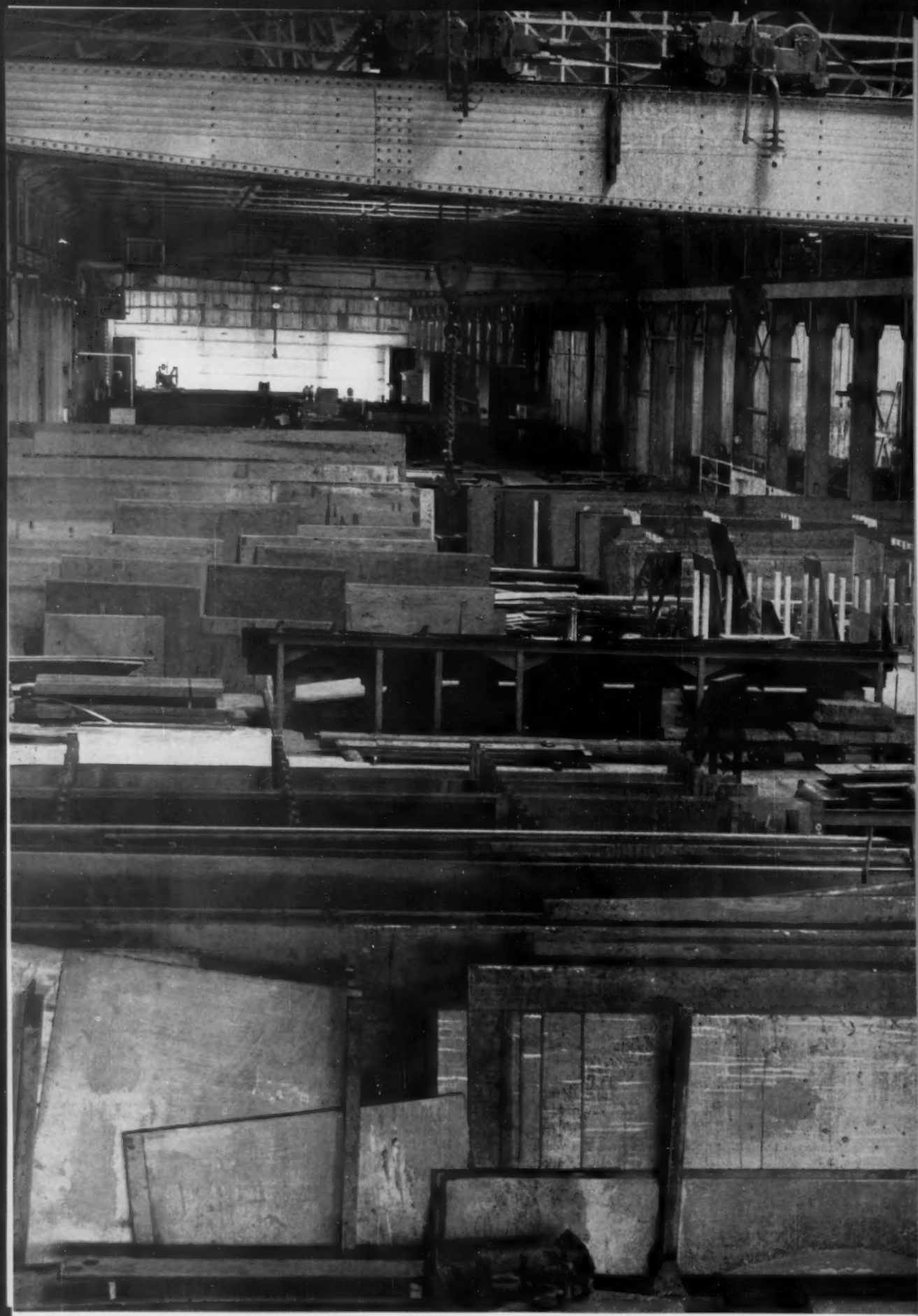
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- ◆ Ceramic brazing jigs have helped to cut production costs and boost production in both small and large operations . . . They are remarkably stable thermally, permitting assembly tolerances down to ± 0.005 in. without jamming, buckling or warping.
- ◆ Brazing time with the jigs has been cut 75 pct . . . At one metal fabricating shop, rejects are down 80 pct and more, while production has been increased 215 pct.

By HERBERT SCHWARTZ, President, Technion Design & Mfg. Co., New York

◆ CERAMIC brazing jigs, even in their present stage of development, have stimulated new interest in low-temperature joining. Inexpensive and expendable, such jigs can slash joining costs in both large and small operations. Coupled with automatic brazing equipment, they offer low-cost production whether it be by torch, induction heating or furnace techniques.

Standard ceramic jigs effectively span the gap between (1) special or infrequent brazing operations best handled manually, and (2) high speed brazing of simple parts where automatic equipment comes into its own. Very often their use will permit bypassing the purchase of costly automatic machines.

These jigs show up best on the cost accounting sheets. Where components to be brazed are in any way complex, the inertness of the ceramic jigs promotes faster and easier brazing; at the same time providing superior product quality.

One manufacturer reports a 50 pct cost reduction in fabrication of a small part. Ceramic jigs saved still another firm \$7,500 in one year on its combustion gas bill alone by permitting

use of a fuel with a lower btu value. Time required to reach brazing temperature has been cut up to 75 pct by virtue of the refractive's tendency to bounce heat back into the work-piece.

Rejects due to defective brazes and poor pre-positioning are down 80 pct and more. Production speeds on mechanized brazing lines have been increased 215 pct. Components to be brazed may be pre-positioned accurately within ± 0.005 in. without buckling, warping or jamming during the brazing operation.

Costs overwhelm advantages

Despite the advantages inherent in brazing for joining, all possible benefits often are sometimes outweighed by excessive costs of time, labor and fixtures. Factors contributing to higher costs in conventional brazing operations are commonly:

- (1) Difficulty in pre-positioning parts in any way complex.
- (2) Difficulty of brazing multiple joints simultaneously.
- (3) Difficulty of brazing blind and complex

joints satisfactorily on a mass production basis.

(4) Need for highly skilled labor.

Heart of the problem in speeding up brazing while lowering costs is efficient and inexpensive pre-positioning of parts. Properties of brazing jigs necessary to meet the many requirements of production brazing include the ability to: (1) withstand extremely high temperature, (2) withstand severe oxidizing conditions, (3) expand without buckling or warping, (4) absorb a minimum of heat from the brazing cycle, (5) resist any tendency to press or weld the assembly, (6) resist corroding the assembly or being corroded by it, (7) resist thermal shock, and (8) resist mechanical shock.

Jig materials unable to meet these qualifications may be and are employed. But their use almost invariably brings up the very cost problems that have made many production engineers sensitive to the word "brazing."

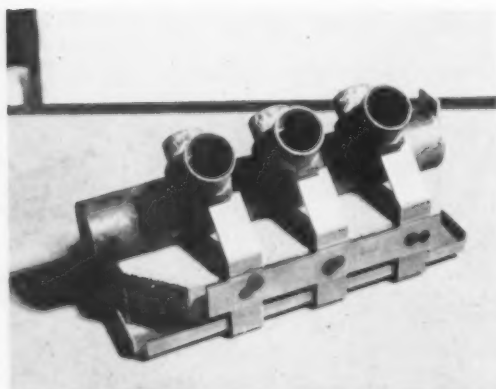
One ceramic jig material developed by Technion Design and Mfg. Co., New York, is promising in that its physical properties apparently meet all the standards listed previously, save

perhaps the last. In simple and standard jigs, suitable for positioning all but the most complex parts, the expendable nature of the refractory material eliminates mechanical strength as a major cost factor.

The new ceramic material is impervious to oxidizing conditions and attack by corrosive atmospheres. It withstands temperatures up to 1800°F. Where high resistance to mechanical shock is required, current development work indicates that ceramic-coated metals may be suitable as jigs.

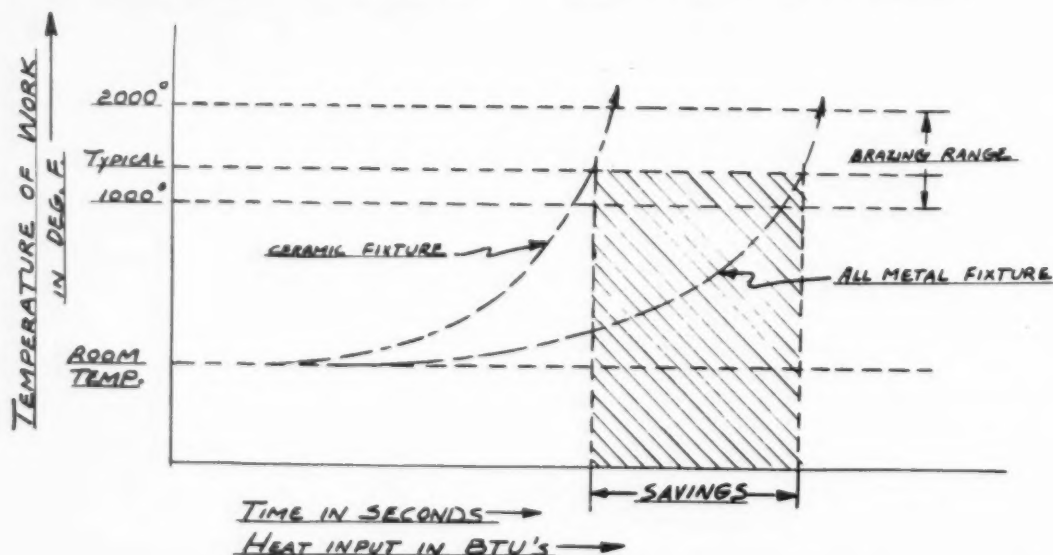
Since the ceramic material is inexpensive (after initial mold costs), it is expendable. Although the jig blocks may be used over and over again, there is never a maintenance problem. When unserviceable, they simply are replaced, completely eliminating tool maintenance and repair as a production cost.

With ceramic jigs, the manufacturer may assemble even complex parts into a fixture for mass production brazing by furnace, induction heating or torch. After pre-positioning, the fixture is fitted into a conveyor that carries it through the brazing heat. On exiting, the



Left: LOW COST stock ceramic jig with simple sheet metal attachment pre-positions copper heat manifold parts for brazing. Rejects were cut 80 pct. Production increased 215 pct.

Below: REFRACTORY ceramic jigs tend to reflect braze heat into workpiece, which reduces braze time up to 75 pct. Expansion characteristics of ceramic in brazing range permit assembly tolerances down to ± 0.005 in. without jamming.



Comparison of Materials Used in Brazing Fixtures

	ADVANTAGES	DISADVANTAGES
METALS*	(1) corrosion-resistant (2) heat-resistant	(1) expensive to fabricate (2) absorbs heat (3) brazing alloy tends to stick (4) warps and buckles
COATED METALS**	(1) corrosion resistant (2) heat resistant (3) combines good physical properties of metals and alloys at lower cost than all-alloy fixtures	(1) still expensive to fabricate (2) absorbs heat (3) brazing alloy tends to stick (4) warps and buckles
CERAMICS	(1) low cost (2) no warping or buckling (3) refracts heat (4) no alloy sticks to it (5) corrosion resistant	(1) relatively fragile
CERAMIC-COATED METALS	(1) combines good physical properties of metals and ceramics	(1) must be quenched slowly (2) largely experimental at present

*Stainless steels, nickel-chromium alloys, etc. **Carbon steel coated with nickel alloy spray.

fixture and brazed part are transferred to a quenching bath. Here the part can be automatically dislodged by gravity, and dropped into a pickle bath for cleaning. Subsequent inspection and finishing lend themselves to mechanization, because the bottleneck of a slow brazing line no longer exists.

Reduces brazing time

In joining a copper heating manifold assembly, one manufacturer has cut brazing cycle time by 75 pct. Rejects have been reduced about 80 pct on the same operation, which requires simultaneous brazing of six joints.

Because of their thermal stability, the jigs have overcome severe alignment problems. Previously, when the copper heating manifold was jigged with metal fixtures, warping and buckling under heat occurred.

Another somewhat unexpected benefit also arose when ceramic jigs were introduced by this metal working plant. Fluxes and brazing alloys did not "wet" the ceramic. The earlier problem of sticking by the metal fixture to the brazed assembly had been tolerated as just another nuisance problem.

The entire operation in assembly of the copper heating manifold was speeded up about 215 pct, due almost entirely to the new jigs.

Savings through use of ceramic jigs mount in mass production of assemblies employing the same basic style of ceramic jig. An electrical component manufacturer recently ran a sur-

vey comparing costs of brazing with machined iron fixtures and with ceramic jigs. Manufacturing costs per 1000 brazed assemblies were \$0.246 each with iron fixtures and \$0.039 each with the ceramic, a saving of more than 20¢ on each brazed component.

A similar comparison from an aircraft equipment manufacturer showed savings of about 12¢ on each brazed part. Previously used machined iron fixtures corroded and warped, necessitating repair after each 100 assemblies and complete replacement after brazing 200 components. Initial cost of the metal fixture was \$25. Replacement fixtures added \$100. Repairs to fixtures were \$50 more. Total for 1000 parts was \$175, or 17½¢ for each assembly.

Mold cost of the ceramic jig was twice as much (\$50.30) as the entire cost of the machined iron fixture. But no maintenance was needed. Every 100 assemblies, the jig was replaced at a cost of \$0.30, or \$2.70 for the 1000 workpieces. Manufacturing costs per assembly dropped to \$0.058, saving 11.7¢ each over the earlier fabricating method.

Substantial reduction of brazing costs promised by efficient use of ceramic jigs justifies reconsideration of brazing as a joining method where previously it may have been discarded. Where a component is designed to take advantage of one manufacturing method, some changes may be necessary to permit most advantageous jigging for braze-fabrication.

In high-speed setup—

Aluminizing Curbs High Temperature Erosion

By W. G. PATTON, Engineering Editor

♦ FACED with a tough production decision, engineers and metallurgists at a major Detroit auto plant deliberately backed away from two obvious answers and attacked the problem on an entirely different technological level. Result is one of the first high-speed installations flame spraying corrosion-resistant aluminum on alloy steel engine valves.

Dual choices presented themselves, emphasized by need for improved performance characteristics of engine intake and exhaust valves. With minor redesign, production could commence on 1956 engines at Pontiac Motor Div. of General Motors Corp. The same valve material could be used as before, with similar manufacturing techniques and comparable costs. Alternate was redesign of the Pontiac valve production line to adequately handle a more highly corrosion-resistant valve material.

The improved valve stock would in all probability break the cost barrier arbitrarily established as the acceptable maximum. Yet steps in that direction apparently were essential. Improved engine performance carried with it the burden of increased cylinder pressures and high operating temperatures. Both increase likelihood of valve burning under continuous operating load.

Obviously, coating valve seats with corrosion-resistant material was one way of sidestepping the entire problem. Aluminum dipping offered a

♦ Cost-conscious designers sometimes hit a stone wall when product improvement hinges on using more expensive base metal . . . Option of coating with a nobler metal often is unattractive because costs can boost the finished price beyond that of the superior material.

♦ Spray metallizing lends itself to compact automation, enables low cost surface beneficiation . . . A two-cycle induction heating setup allows automotive engine valves to be aluminum-sprayed automatically at 4000 parts hourly.

possible solution, since industry experience indicated up to a 100-pct increase in valve life was possible with such a coating. But dipping seemed apt to create a production bottleneck.

Aluminum spraying was considered acceptable, provided a low cost application technique could be developed. Other automotive firms, notably Thompson Products, Inc., for Chevrolet, already were aluminum spraying exhaust valves, but in a multiple-step manual transfer process that appeared unsuited to Pontiac's mass production requirements. At 16 valves per engine, 4000 were required hourly—about 32,000 valves in an 8-hour shift.

Any practical solution to the problem involved: (1) Developing satisfactory conveyors and fixtures to provide high-speed, continuous flow of parts to be coated; (2) Working out heating and cooling cycles economical for use on commercially produced valve material; (3) Developing a method of spraying aluminum precisely on a small area within desired thickness tolerances at acceptable production speeds; (4) Holding material costs, production costs and maintenance expenses down to a level competitive with other manufacturing methods.

The solution evolved in cooperation with Lindberg Engineering Corp., Chicago, calls for rapid and selective aluminum coating of finish-ground valves as the parts rotate rapidly and move forward on a special conveyor. A double-heating

operation is required, as well as a carefully regulated cooling cycle.

Close control of valve spinning rate results in a smooth, dense coating. Bonding between the two metals is virtually instantaneous due to formation of an iron-aluminum alloy at the interface. Formation of this alloy is further facilitated by the heat treatment following.

Prior to spraying, valves are rough-, semi-, and finish-ground to specifications. Exhaust valves, the more critical of the two, are solution heat treated at 1900°F, then age-hardened 14 hours at 1450°F to develop desired physical properties.

Both material composition and heat treatment play an important role in the aluminizing operation. Pontiac intake valves are ferritic steel, containing approximately 4 pct Si and 2½ pct Cr. Exhaust valves are alloyed of 5 pct Ni, 23 to 24 pct Cr and 3 pct Mo. Composition of exhaust valve stock is such that the alloy is sensitive to formation of sigma phase embrittlement. Hence forging temperature as well as solution and aging heat treatments must be precisely controlled.

Magnetic permeability of the valve steels is altered by heat treatment. This in turn influences length of the heating cycle necessary to bring valves up to desired metallizing temperature.

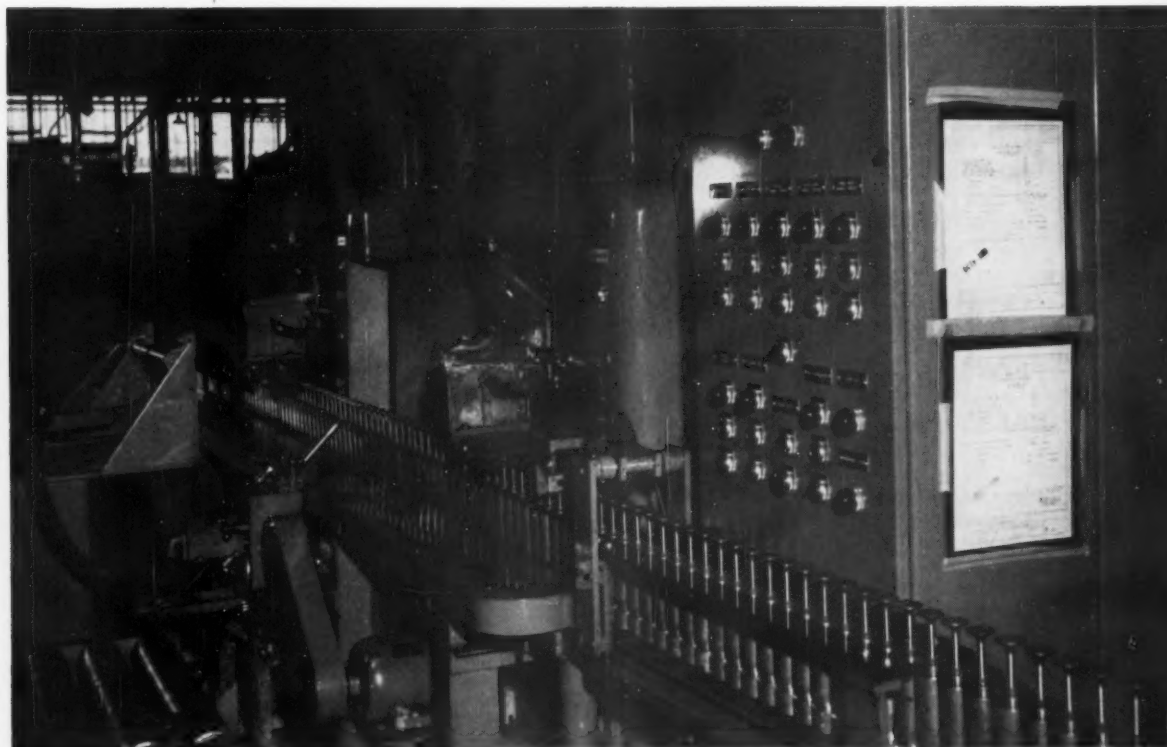
Pontiac's new valve aluminizing equipment includes two production lines: one for intake valves, the other handling exhaust valves. Time cycles and temperatures on both lines may be adjusted to accommodate either intake or exhaust valves.

Precision fixtures are mounted on a chain conveyor.

Bonding aided by uniform heat

Fit of valve stems in fixtures is critical, since looseness permits wobbling of rotating parts. Wobbling may be expected to show up in uneven heating of valves, which reflects itself in poor coating uniformity and occasionally inadequate bonding at the iron-aluminum interface.

Height of valve heads above the conveyor fixtures also is important. All valves must pass beneath a rubber wheel mounted ahead of the low temperature heating equipment. This precaution avoids the possibility of valves striking



FINISH-GROUND valves enter aluminum spraying line at right, pass beneath rubber wheel to insure proper height of valve heads. First induction heating section (center) raises temperature to 450°F.

Aluminum spraying follows. Second heating section (far left) operates at 1450°F, completes formation of iron-aluminum alloy. Conveyor moves at 5½ fpm. Valves are manually unloaded.

the heating unit. Normal speed of the conveyor is 5½ fpm. Valves are located on 2-in. centers.

Just before valves reach the low temperature heating section, their stems contact a belt drive which spins the parts at 550 rpm. Rotation continues as the valves pass under the heating unit. A common, return-type induction heating coil is employed. One bar is positioned above the head of each valve, and two bars are beneath as they ride through on the conveyor. The unit raises temperature of valves to about 450°F.

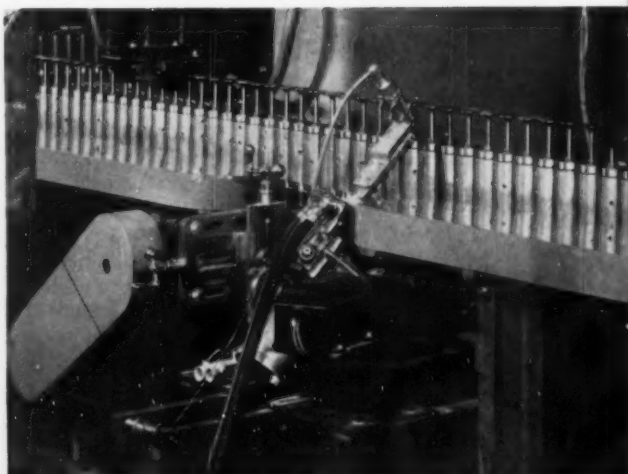
Aluminizing precisely controlled

Immediately after heating, rotating valves are sprayed with aluminum. An electrically-driven metallizing gun automatically spews tiny globules of molten aluminum on each valve seat in precisely the correct location and angular direction. Pure 15-gage 2S aluminum wire feeds directly into an oxyacetylene flame, and is deposited on the valves in a band about ½-in. wide. Thickness of the deposit is closely controlled by the spinning rate of the valves. Approximately 0.065 g of aluminum are deposited on each valve seat face.

Gun outlet is positioned about 2½ in. from the point of application. Excess aluminum is carried off by an exhaust fan.

Following application of aluminum, the valves gradually lose rotational velocity as they move 4 ft further along the conveyor. Shortly before reaching the high-temperature heating section, valve stems again contact a belt drive that accelerates rotation to 550 rpm.

Second heating cycle also employs induction coils, this time to raise valve temperatures to about 1450°F. Essentially, the second treatment is a molecular diffusing process designed to com-



PURE aluminum is flame-sprayed directly on rotating valve seats in precisely directed ½-in. wide band. Valves are heated to initiate near-instantaneous Fe₃Al alloy bonding.

plete formation of the Fe-Al alloy at the interface. Heat application also fuses aluminum globules into a dense, uniform coating.

When valves are heated by induction, temperature rise occurs first at the surface of the steel alloy, later in the aluminum coating. Since the heat moves from the inside toward the aluminum outer surface, both metals are alloyed without forming aluminum oxide at the interface. A thin protective layer of Fe-Al alloy is developed which resists burning.

After the second heating operation, the valves continue to move along the conveyor. Cooling is accomplished by blowing a controlled air flow on the valves at two different conveyor locations. Metal shields perforated with air holes permit regulated escape of heat. The shields also prevent accidental contact with the hot valves, a desirable safety feature.

Following cooling, the valves are removed manually from the conveyor. Runout and warp are carefully checked on valves selected at regular intervals. Specifications call for maximum warp of 0.003-in. total indicated reading after completion of all manufacturing, heat treating and aluminizing operations. Visual inspection verifies that the coating of Fe₃Al is sufficiently thick. From 0.00075 to 0.001 in. is desired.

Electrical requirements for the Pontiac setup call for 60-cycle, 3-phase power at 440 v.

In energizing the aluminizing line, power is brought into the magnetic motor starter, which

SAFETY DEVICES

PROTECT AUTOMATED EQUIPMENT, PARTS AND PERSONNEL

■ Once aluminum spraying operations begin on a production run, the line continues automatically without further attention until:

- 1) The master cycle stop button is pressed.
- 2) The high-frequency generator stop button is pressed.
- 3) The conveyor drive stops.
- 4) The metal feed to the spraying gun stops.
- 5) A valve is improperly aligned for entry into an induction heating coil, which trips a safety stop.
- 6) The flame on the aluminum spraying gun goes out.
- 7) A void of more than two valves occurs in the production line.
- 8) Dust collector fan goes off.
- 9) Emergency stop is pressed at unload station.
- 10) Any of generator protective devices operate.
- 11) Any of the control station or heating station protective devices operate.

Occurrence of any of these conditions stops the conveyor completely and turns off the high frequency power to the work coils.

operates on reduced voltage. Two auto-transformers in the motor reduce voltage to approximately 65 pct that of the line voltage. Current then is applied to the 175-hp, 3-phase, squirrel-cage, induction drive motor.

As the motor reaches full speed (approximately 3600 rpm), the motor starter automatically applies full line voltage.

Both drive motor and high-frequency generator are of the totally-enclosed, horizontal shaft, two-bearing type, with a roller bearing on the generator end and a ball bearing on the motor end.

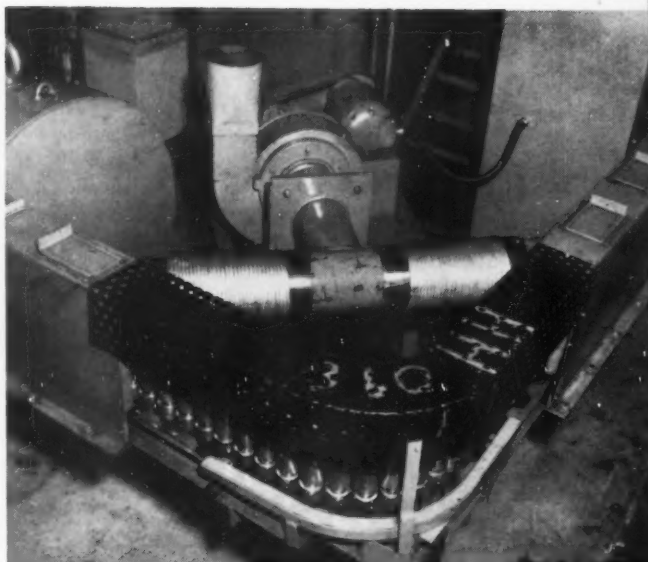
The generator is an inductor type in which the rotor protrusions create a pulsating flux which results in single-phase power output of 9600 cycles at 800 v. Both armature and direct current field windings are on the motor. No brushes, collector rings or commutator are required.

Controlled from central station

Output from the high-frequency generator is fed to a generator control station. The control station governs generator output and regulates application of this power to the pre-heat and final-heat stations. In the control station are necessary controls and meters for controlling and observing the electrical operation of the setup.

All necessary controls are conveniently located on the control station front panel. The rear access door is mechanically latched to the main circuit breaker. When this door is opened, all equipment shuts down.

Generator power is fed to the heating stations



AIR COOLING valves is accomplished by blowing a controlled flow at two locations. Perforated metal shields regulate escape of heat and protect personnel against injury.

through the main contactor. In each heating station is a variable transformer that reduces generator voltage from 800 v to a 40 to 80 v range. This voltage is applied to the single turn inductor through which the valves pass in the heating operation. The transformer is water-cooled and designed to handle the large high-frequency currents with an ample safety factor.

Each heating station also incorporates necessary capacitors for correction of the power factor of the load. This power factor is inherently low in induction heating operations.

Equipment protected by cooling

The capacitors also are water-cooled. Both they and the transformers are protected against failure due to inadequate cooling. Preset switches automatically cut the power on detection of sub-normal water flow.

High-frequency current flowing through the inductor work coils is several thousand amperes. It induces a similar current in the valve heads as they are conveyed past, which raises their temperature to that needed for proper aluminizing of the valve seat.

Remainder of the electrical equipment consists of control panels housing the various relays, motor starters and protective devices operating conveyor lines, heat exchanger and dust collector. The entire electrical system is interlocked and so connected as to provide flexibility, safety and maximum assurance of product uniformity.



ALUMINIZED valves display sprayed coating on valve seat only. Inspector visually checks film thickness. From 0.00075 to 0.001 in. is desired, in a smooth, uniform coating.

Conference Method Sparks Effective Safety Program

♦ Effective safety training programs require more than mechanical safeguards, special committees, penalties and periodic lecturing at employees . . . They take widespread interest—and active cooperation all down the line.

♦ The conference technique helps . . . Proved out in a number of plants, it encourages employee participation . . . Discussions prompted frequently are carried over into the shop, the best mark of mounting employee interest.

By A. M. COOPER, Indio, Calif.

♦ PUTTING proper safeguards on factory machinery, organizing safety committees, setting up penalties for safety rule infractions are a good start toward accident prevention. But they still leave the most important phase to be installed—the training of each worker to think safety 24 hours a day.

The best method of safety training is that which encourages employees to discuss the underlying causes of accidents and develop means of doing away with these.

Much expense can be saved and a better job done when such safety discussions are conducted by the immediate supervisors of the workmen. The characteristics of a good supervisor and of a good conference leader are identical. It is not necessary to give supervisors formal training in conference leadership before they lead discussions.

The following is a simple method for installing such a training program:

To begin with, the administrator of the program, the training supervisor or safety engineer, should be an expert conference leader. He meets with the supervisors of a division and explains the program to them. He then leads a demonstration conference, with the supervisors acting as the discussion group. This conference is the identical one each supervisor present will lead with his subordinates during the months to come.

The first round of employee meetings follows. In each of these hour-and-a-half sessions the supervisor explains how the conferences will be conducted, then puts the first discussion to the group: "What are the underlying causes of acci-

dents in our department?" As bona fide underlying causes are suggested, these are listed on the blackboard. Confusion as to exactly what an underlying cause is will soon disappear.

The blackboard list will number 20 or more. Negligence, or carelessness, will be near the top, with haste, over confidence, and absent-mindedness appearing shortly.

When a satisfactory list has been established the leader asks, "Which of these underlying causes, in your opinion, are responsible for the greatest number of accidents in our department?"

Basis for master list

The decisions of the group in thus establishing the order of precedence are less important than the discussions that will be stimulated in determining, among underlying causes of accidents, which will be No. 1, No. 2, etc.

At the end of the first round each foreman turns in to the training supervisor the list of underlying causes developed by his group and their order of importance. The training supervisor then boils down these lists and comes up with a master list of causes. This master list actually constitutes a course outline in accident prevention, applicable to the entire division and prepared by the employees themselves.

By assigning one or more meetings to the discussion of each subject, there is ample material here for a two-year course in the finest kind of safety instruction. Obviously, subjects at the top of the list will be discussed first, and this is as it should be, since these cause most accidents.

Before each round of employee meetings a

UNDERLYING CAUSES OF ACCIDENTS

	Weight
1. Negligence	339
2. Haste	265
3. Overconfidence	217
4. Lack of knowledge	214
5. Worry	208
6. Absent-mindedness	192
7. Improper supervision	168
8. Physical defects of men	160
9. Fear	150
10. Defective equipment	144
11. Lack of cooperation	142
12. Wrong mental attitude	140
13. Horseplay	106
14. Misunderstanding of orders	91
15. Disobedience of orders	61
16. Lack of emotional control	56
17. Poor judgment	51
18. Bullheadedness	42
19. Lack of interest	36
20. Recklessness	25
21. Outside interference	15

demonstration meeting is held. At these each foreman is supplied with a detailed conference plan outlining everything he is to do in the conferences he leads with his subordinates. This plan is a wonderful prop for the foreman when the going gets rough. In preparing it the training supervisor should make an effort to foresee every conceivable contingency which may arise in the foreman's meeting. This comes with practice.

Supervisors enjoy leading these safety conferences. They are the logical instructors for those reporting to them and soon become adept at leading discussion.

Actual procedure in employee conferences after the opening one in this training program is to follow an individual conference plan. Each plan lists a number of sure-fire discussion questions. Each is based on the subject to be discussed at that meeting—negligence, worry, or whatever it may happen to be.

These cases are developed by the training supervisor, and may refer to actual or imaginary accidents or situations. It is important that they be well and carefully written, in order that they be extremely thought-provoking when put before the groups for discussion.

Those who have attended only the lecture type of safety meeting may be amazed at the thought displayed by a group of workmen in their discussions in this type course. No human-factor problem in safety is too abstruse for them. Even experts in this field often express surprise at the thought displayed in their search for the best

ways of obviating underlying accident causes.

As the program progresses the training supervisor can be of further assistance to the foremen if he will attend, as a silent observer, various meetings conducted. At the close of such meetings he should avoid making oral criticisms to the foreman regarding his conduct of the conference. The foreman is not then in a proper frame of mind to listen to criticism.

But on the day following, a written critical report of the meeting should be forwarded to the foreman by the training supervisor. In this, all good and bad performance in conference leadership should be mentioned. By the time the supervisor gets this he will be ready to take criticism.

Discuss local problems

Many advantages accrue when the foreman leads discussions on safety with his own subordinates. Not only does the discussion always apply to the daily work of this particular group, but when decisions are arrived at in these conferences they are at once put into effect on the job. This is true since the foreman is uniquely in a position to see to it that such agreements are carried out.

Foremen learn to lead conferences by leading conferences. In the demonstration meetings, time is allowed for discussion by foremen of difficulties they have encountered in leading meetings. During this period they acquire further knowledge about how to meet various typical conference situations. Furnishing them with printed or mimeographed brochures of suggestions to aid them in meeting such situations has been found worthwhile.

In many years of using this method of safety training I have encountered but one foreman who simply could not be developed into a good conference leader. And this man's difficulty had its roots in his unfortunate relationship with his subordinates on the job. It is true that if a foreman has not won the confidence, respect, and liking of those reporting to him he may find it necessary to revise his supervisory methods before he can develop into an adequate discussion leader. The training program thus often improves the quality of supervision as well.

The results obtained by this safety training program are readily measured in terms of reduction of frequency and severity rates of injuries to workers. These reductions are, of course, made known to the work force, and constitute the best possible reason for continued interest in the program.

You get such results from any safety training program only when you cause employees to think safety all day long. Frequently, with the conference method, they will start hot discussions of safety problems during working hours, such discussions constituting carry-over from the training conferences. This carry-over to the job is the best reward you can hope for from any employee training program.

Can Precision Casters Meet Gas Turbine Needs?

♦ Precision casting may play a prominent role in the automotive gas turbine of 1965 . . . But many conditional "ifs" qualify the extent of that role . . . Extruders and forgers also will be hotly competing for their share of the enormous market potential. . . . Engineers hopefully await new techniques.

♦ Initial reports from Detroit speak of general satisfaction with casting as a production method for many gas turbine parts . . . Ability to meet cost, weight and space requirements will determine whether the casting industry is to dominate the automotive turbine future.

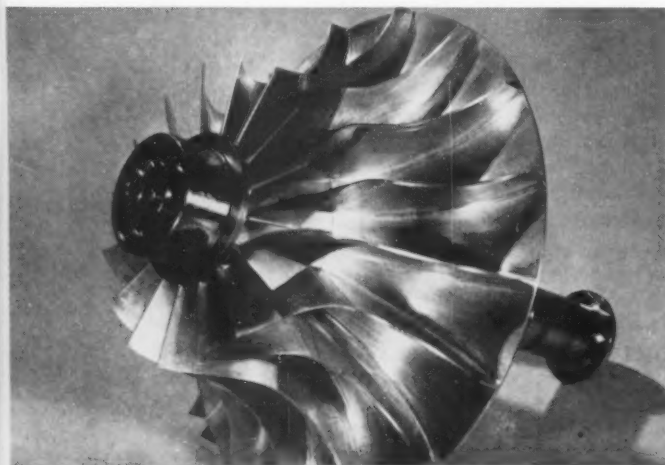
♦ DETAILED reports are beginning to trickle back to precision casters from Detroit automotive engineers on performance of castings in experimental gas turbines. At least one major car maker already has gained considerable experience with cast compressor and turbine components, much of it favorable.

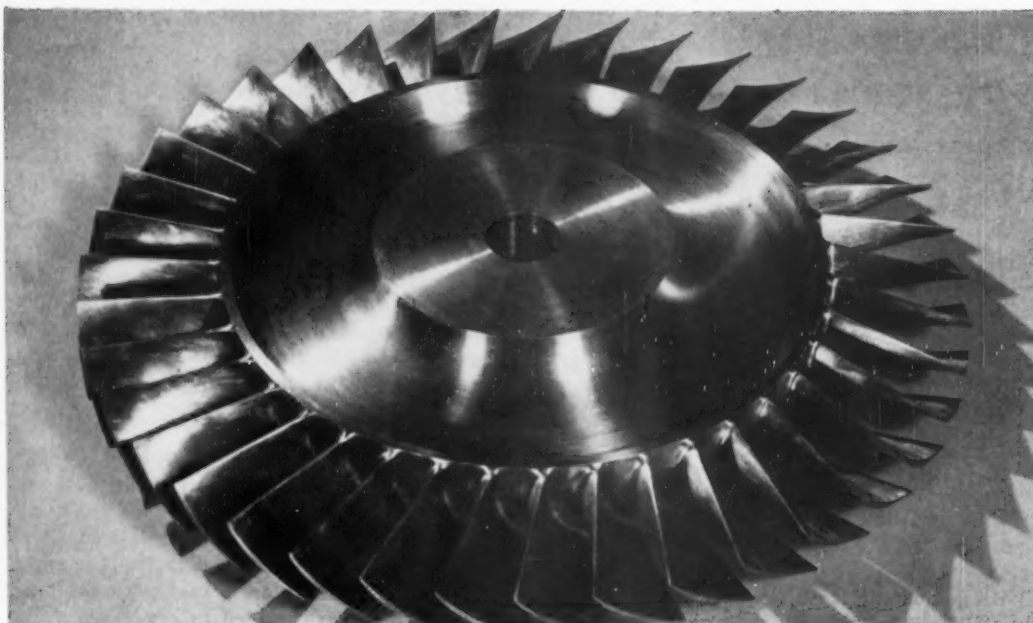
But the same manufacturer is vehement in expressing need for less costly precision casting techniques (see *THE IRON AGE*, December 1, 1955, p. 106).

In essence, this firm claims the automotive gas turbine requires as-cast parts with properties characteristically available from invest-

NEED for two-piece construction of centrifugal flow compressor saddens Detroit engineers. Aluminum inducer (left) is cast in a permanent mold. Expeller (right) now is forged but should also be cast.

BEARING housing (darker section) is cast of nodular iron with thin wall sections. To reduce weight, even thinner walls are desired. Accurate shell molding may be one answer.



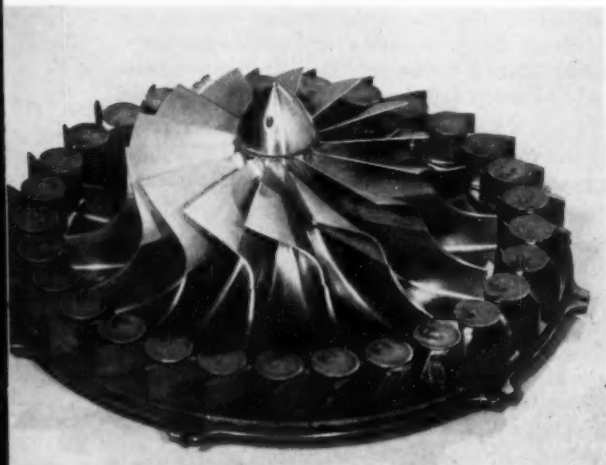


EXPERIMENTAL axial flow turbine wheel was machined from the solid. Stubby blades will be rela-

tively easy to cast in production quantities. All-cast wheel may be feasible.

ment castings, including minimal machining and smooth surface finishes. Yet these same components must be produced without that casting technique's disadvantages. Particularly troublesome is the time-consuming and costly use of wax or plastic patterns, according to D. N. Frey, Associate Director of Ford Motor

ADJUSTABLE nozzle vanes are investment cast. Costs must be cut, perhaps by design change. Note similarity of turbine blading to compressor blading (far left), another cost reducing feature.



Co's. Scientific Laboratory who spoke recently before the Investment Casting Institute in Detroit recently.

Predictions are freely made of millions of gas turbines on American roads by 1965. Role of the precision caster in this promising future of the automotive industry may well depend on his ability to meet unusually stringent demands.

Weight and space requirements of the gas turbine powerplant are among the reasons Detroit engineers look with favor on precision castings. Fortunately, experience of casters in production of aircraft components has helped develop solutions to casting the intricate contours and thin sections necessary to meet weight and space considerations.

But looming above these two design factors in relative importance is the spectre of cost. Answers to the cost problem show little sign of coming forth in the immediate future. Those answers derived from casting experience for the aircraft industry are most often unhelpful. A new slant to cost reduction is necessary, one that takes advantage of wartime advances in precision casting, but shuns the "costs-be-damned" attitude often met in those years.

Unfortunately, evolution of such new techniques is not an easy matter. Designers both in the automotive and casting field have preconceived notions, certainly with some justification, about the necessary relationship between design features and their effect on costs.

Where space is a problem, convoluted and

"With maddening logic . . . casters contend that with complex castings, costs head for the ceiling . . . Automotive engineers cannot accept the argument."

highly original design compromises often result. In the case of the automotive gas turbine, gas flow path in several experimentally successful models follows a necessarily tortuous course to meet space requirements. Complex and intricate castings result.

Weight reduction too is a problem with some gas turbine components, such as the heat exchanger commonly incorporated to increase low-speed efficiency. Thinner sections, webs and other conventional approaches provide adequate answers, but complicate the casting process.

With maddening logic (to Detroit engineers, at least), casters contend that where complex and intricate castings are necessary, costs head for the ceiling. And the casters have years of experience to back up their point.

Automotive engineers cannot accept the argument if the gas turbine is to be economically feasible for automotive application.

Many compressor expellers in use today are true investment castings. Their cost seems to be at least three times too high, according to Dr. Frey. He adds that apparently the cost of the casting process itself must be reduced significantly. Low cost investments and elimination of wax or plastic patterns is desirable, and Ford feels that efforts may profitably be directed along those lines.

Both centrifugal and axial flow compressors must eventually be precision cast to achieve maximum economy in mass production of the automotive gas turbine. With the compressor, an added design consideration enters: need for better materials and casting techniques enabling an improvement in physical properties.

Castings only partly adequate

In one two-piece compressor design, the properties of cast aluminum inducers are satisfactory for the stresses encountered, with the possible exception of fatigue life. But Ford has met with no success to date in casting aluminum compressor impellers for this design. Physical properties of cast impellers are inadequate. Thus far, a forged impeller is required in this particular compressor configuration.

Surprisingly, certain cast magnesium alloy impellers have proved more than adequate in their physical properties. Bursting speeds in excess of 2000 fps have been achieved in test. This superiority of cast magnesium over cast aluminum may be due to better ductility of the magnesium alloys.

Fire danger of cast magnesium impellers results from rubs that create heat and fine magnesium powder. But nonetheless magnesium cannot be discounted as a possible solution to the impeller stress problem. Extensive field service tests will be needed to resolve the question of suitability of the metal.

Dreams of all-cast wheel

In many gas turbine powerplant designs, axial flow compressors and turbines are used. An all-cast turbine wheel is most desired. Perhaps it may be achieved by a multiple casting process where the rotor is cast onto the previously cast and assembled turbine blades.

Cast compressor blading is feasible, even mandatory. But an all-cast axial flow compressor rotor appears marginal at present because of the severe stress and temperature conditions. Compressor spindles (minus blading) have been cast of aluminum alloys for years by jet engine manufacturers.

In casting compressor and turbine blades, costs must be sharply reduced. One widely mentioned figure calls for a maximum casting cost no more than 15¢ per cast blade above metal cost.

Low cost parts win

Gas turbine engineers in Detroit are by no means restricting their thinking to precision cast parts. Paramount interest undoubtedly is in cost reduction. Consensus is that castings are potentially a means to that end. But forged and machined components will play their role. Adjustable nozzle vanes are now investment cast at Ford, for example. Should cost reduction efforts fail, vanes may be redesigned to utilize other fabrication methods. Incorporation of an extruded wrought section is one such possibility.

Blade alloys will encounter top temperatures in the 1500°F range, somewhat below maximum temperatures in modern aviation gas turbines. Thus austenitic casting alloys appear necessary in such automotive gas turbine parts as compressor-turbine blading and radial inflow expellers. Low alloy cast ferritic materials are satisfactory for power stage turbines, whether in the blades or in an all-cast structure.

Cost and availability considerations restrict austenitic casting alloys to those with an iron base, no cobalt and a minimum of nickel. This contrasts with high-alloy jet engine alloys.

Spray-Welded Alloy Overlay Triples Part Life

♦ **HARD-FACED**, spray-welded alloy overlay is responsible for tripled life of reciprocating rods installed in hydrogen compressors working at 800 psi. Rods of AISI C-1035 carbon steel previously lasted about six months with a hard, chrome-plated surface, according to maintenance records.

The hard-faced, alloy-coated rods have been in constant use more than 18 months. They are still servicable, and in operation at the Corpus Christi, Tex., refinery of Delhi-Taylor Oil Corp.

Most abrasion of the compressor rods in service results from contact with the rod packing, which picks up dirt and other abrasive particles. Each rod replacement involves substantial compressor downtime, considerable maintenance labor cost and the cost of the replacement part.

In May, 1954, specifications on the Ingersoll-Rand compressors were altered by the refinery to call for a spray-welded overlay of hard-facing alloy on that portion of the rod where critical abrasive conditions are encountered. A chromium-boron-nickel alloy was selected by the supplier, Wall Colmonoy Corp., for its abrasion resistance. The 56 RC to 61 RC coating has a low coefficient of friction and is readily machined.

Operates three times longer

Since their installation about 1½ years ago, no alloy-coated rods have been replaced. The rods still are in operation, indicating a useful service life in this application at least three times that of the rods with a hard chrome surface coating.

Prior to hard-facing, the base metal is roughed turned approximately 0.070 in. diam undersize on the critical rod area. Rough turning produces a clean, rough-grained surface for good mechanical bonding of the sprayed, hard-facing



ROUGH-TURNED compressor rod is sprayed with powdered alloy to 0.035-in. thickness. A 1900°F flame then fuses the coating to the rod.

alloy. No other preparation is needed normally.

With the part still in the lathe, a 0.035-in. layer of powdered alloy is sprayed on with a special pistol unit as the rod rotates.

While rotating between centers on the lathe, the rod is heated by an oxy-acetylene torch to approximately 1900°F. This temperature is just enough to fuse the overlay, but not sufficient to cause warpage. The result is a fusion-bonded, non-porous, welded overlay, high in abrasion, corrosion and impact resistance.

The coated rod is then finish-ground to close-tolerance dimensions.

Computer System Specifies Correct Grinding Wheel Formulas

♦ Day of computer-controlled production may not be too far off . . . Already punched cards representing customer orders are integrated and coordinated by computing equipment . . . Human error is eliminated right down to the production foreman level.

♦ Orders directly from the field arrive on perforated tape and are fed into an electronic machine that calculates the correct grinding wheel formulation, calls out raw materials necessary, specifies manufacturing instructions and schedules delivery dates.

♦ FIELD engineering to home office to factory via teletype and computer-punched cards demonstrates the speedy, new production control setup of a New England abrasives manufacturer. Most impressive part of the process is the last leg of the manufacturing triple play. By means of electronic equipment, a direct connection is provided between field engineers and the actual production shops.

No longer do production engineers swear about meeting customer specifications. No longer do production clerks cluck unhappily about meeting production schedules and delivery dates. All is handled by a quietly purring machine whose only outward sign of activity is a multitude of sporadically flashing lights.

Teletyped from the field

In one of the first such systems in the metal-working industry, and the first reported in the abrasives field, a computer installation controls and integrates production of all grinding wheel orders. Punched cards govern from the time orders are teletyped in by the field right through to transmittal of those orders to the production foreman assigned the job.

Most ingenious application of computer control in the system is analysis of customer specifications and development of abrasive formulations to meet those specifications. The machine also spews out related data. Detailed manufacturing instructions are supplied automatically, as well as other information necessary to produce the grinding wheels on time: quantities,

packaging information and shipping dates.

Variety of customer requirements was a strong factor nudging Bay State Abrasive Co., Westboro, Mass., in the direction of coordinated production control. Literally thousands of different kinds of grinding wheels are used throughout the metals industry. Although standardization is reached in many cases, virtually every new grinding job is different. Thus, various abrasives of multifold characteristics are required.

Normally, a set procedure is followed in designing a grinding wheel for a new application. First the situation is checked by an abrasives engineer. He recommends a wheel specification that will furnish the qualities desired.

Calculation of an abrasive formula follows. This formula tells the factory the proportion of the various abrasive ingredients needed to make a wheel matching the engineering specifications. The formulation links field engineering and the production shop. It is vital to the manufacturing process producing grinding wheels.

First step toward electronic production control was taken by Bay State with the help of the Mark IV computer at Harvard University's Computation Laboratory. Every known factor affecting the ability of a wheel to grind was translated into machine language and fed into the computer. Information was included on increments in grinding wheel hardness and abrasive grain concentration.

Result of the calculations was a series of straight line progressions. Somewhere along



INFORMATION on punched cards fed into center machine is transmitted to computer (right). Listing machine (left) reproduces results, prints manufacturing data. Cards are filed for later use.

these lines lie the characteristics of every grinding wheel conceivable to production engineers.

Next step in the process was translation of these grinding wheel formulas into punched cards suitable for coordination with actual customer specifications.

In normal operation, the system works along these lines: From a branch office comes recommended specifications for a particular grinding wheel application. These specifications arrive on teletype in the form of a perforated ribbon. The ribbon is fed directly into an electronic machine that reads the holes and cuts corresponding rectangles into a standard punched card or cards. If desired, the order may be printed in English at the same time—slightly on the electronically backward side, but a bit more legible to most.

Determines manufacturing process

Punched cards then are fed into the computer with cards covering the progressions of grinding wheel formulas. Calculations determine the raw materials required and the manufacturing methods most suitable for production of the grinding wheel.

On orders, punched cards cover quantities, shipping dates and other information. Manufacturing instructions, ingredient by ingredient, are typed out by the equipment on manufacturing forms. These are forwarded immediately to the factory.

Possibility of human error in these calcula-

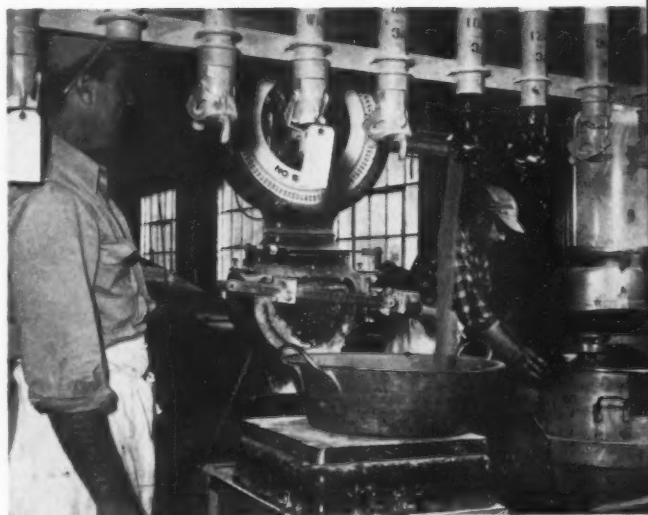
tions is eliminated for all practical purposes. Self-checking features are included that help catch even mistakes originated by the branch office teletype operator.

Every card carrying the "constant" formulation data developed is kept on file. Subsequent orders from the same customer for an identical application may be formulated exactly as the initial order.

Remembers inventory data

In addition to calculation of grinding wheel formulas, the system correlates other valuable data. Amount of raw material used on each order can be stored by the computer as formulation calculations take place. Later this information may be stripped from the equipment as needed. Naturally the installation is used in accounting, market research, sales and other company activities in order to most fully utilize available machine time.

Next step in production control may be some time in the future. But the company knows what it wants. It claims similar electronic computing equipment can and will be applied to the manufacturing process itself, with ingredients of abrasive products being automatically selected, weighed, measured, combined and processed. And all controlled by punched cards through to the packaging operation.



RAW materials are mixed in accordance with computer-calculated formula. Processing is directed by punched card instructions interpreted by machine. Human error is greatly reduced.

Improves torque control—

Multi-Nutsetter Produces Bolted Assemblies Faster

♦ **MULTI-NUTSETTERS**, a relatively new development in compressed air-powered production equipment, are finding wider use in industries where assembly involves a great number of nuts, bolts and screws.

High labor cost in the highly competitive automotive field prompted development of the units. Today, a single operator with a multi-nutsetter unit drives up to 20 bolts or nuts at one time. This means labor-saving, simplified maintenance, greater production, increased safety. And compressed air assures a degree of torque control never before possible. This alone permits longer service, fewer breakdowns, and unsurpassed operator convenience.

Adaptability of the equipment makes conversion from job to job much easier. With multiple-nutsetters using standardized components, usually only the mounting plate and

the air distribution tubing need be changed.

Maintenance advantages are particularly important. Here, costs of operating multi-nutsetters incorporating such features as an oiler, separator and filter units in the air line are very low. Again, the fact that machines are never loaded to their full capacity reduces maintenance over individually operated units that have protective features, and are hand-torqued beyond their normal capacity.

Because multi-units cannot be used for hammers to line up the work, they won't receive the abuse sometimes accorded individual machines. Also, they are not apt to be carelessly dropped, since they operate from balancers and air cylinder feeds.

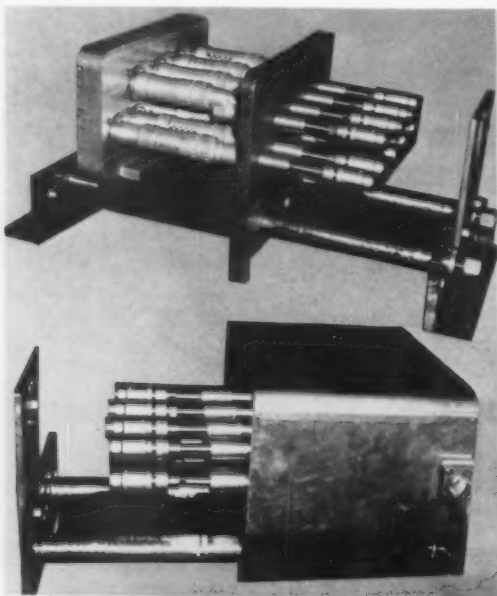
Initial cost of the units is higher. Since the labor savings will pay back the original investment in just a few months, this is no real obstacle. From then on, the unit will repay its cost many times over.

In selecting equipment, it is wise to choose machines that have more stalling torque than is required. This permits their use over a longer period of time, simply by making air regulator adjustments to increase pressure when tolerances in the machine increase with use. This is the reason that maximum torque of machines is not listed on torque ratings of multi-nutsetters. It is perfectly safe to use torque ratings listed. If the manufacturer is told the torque required and spacing of bolts and nuts, he can design the proper equipment.

To assure uniform operation and long life, multi-nutsetters are seldom operated on a pressure more than 40 to 60 psi. Thus, they can be used on high-production lines for long periods of time.

Most units are portably mounted on spring balancers or torque arms, with air-cylinder feed. There are also stationary-mounted units or units with power feeds designed into the machine and assembled progressively.

Most manufacturers are using ½-in. cold-rolled steel for a rugged inexpensive mounting plate. This has proved satisfactory in withstanding the rigors of multiple-nut running.



MULTI-NUTSETTER, air operated and equipped with stud setting attachments, is shown without shroud, top; with shroud muffler, below.



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New Technical Literature:

Catalogs and Bulletins

Gears

A brochure has been issued detail-
ing the various gear and rack man-
ufacturing facilities a company
maintains. Titled, "A Visit With
Braun," it shows an overall view
of the plant, various machines in
operation and lists the wide diver-
sity of gears, racks, sprockets and
other products which the firm man-
ufactures. *Braun Gear Co.*

For free copy circle No. 1 on postcard, p. 93

Ductile iron

Newly issued is "Ductile Iron, the
Cast Iron That Can Be Bent" (Re-
vised Edition), a 28-page bulletin
with tables, charts and photos. Up-
to-date information on ductile cast
iron is given in this comprehensive
publication. Photos show applica-
tions of ductile iron castings pro-
duced and used in the United
States. An added feature is a con-
venient listing of typical applica-
tions in various industrial fields.
The International Nickel Co.

For free copy circle No. 2 on postcard, p. 93

Spray washer

Information is available on a new
small, rotary-drum, batch-type
washer. Discussion is given to the
operation of the unit through a
drum with helical spiral to tumble
parts and expose all surfaces to
high-pressure fan-shaped spray
nozzles inside the drum. The unit's
washing, pumping, drum-reversing
cycle can be either manual or auto-
matic. *The Alvey-Ferguson Co.*

For free copy circle No. 3 on postcard, p. 93

Presses

A new 8-page bulletin provides
specifications, photos and prices on
wax injection presses for invest-
ment casting. Two of the models
discussed feature a new, quicker
acting mold holding device. *Alexan-
der Saunders & Co.*

For free copy circle No. 4 on postcard, p. 93

FOR YOUR COPY

**Money-saving products and
services are described in
the literature briefed here.
For your copy just circle
the number on the free
postcard, page 93.**

Arc welder

Complete description of a welding
unit which provides both current
and voltage control for either ac
or dc welding is contained in an
8-page folder. Space is devoted to
operation of the unit's selective arc
controls, together with recommen-
dations for various welding types
and methods in different applica-
tions. *Lincoln Electric Co.*

For free copy circle No. 5 on postcard, p. 93

Tool designers

A 7-page, fold-out brochure de-
scribes how a production line lay-
out can be combined with automatic
mass machining methods to aid in
cutting costs and speeding produc-
tion of automotive cylinder heads.
Prepared by a designer and builder
of special machine tools, the bro-
chure contains schematic line
drawings which describe in detail
the operating sequence on one such
line. *W. F. & John Barnes Co.*

For free copy circle No. 6 on postcard, p. 93

Boring machines

Featuring cam-operated precision
boring machines, a bulletin cur-
rently issued describes the varied
production operations possible with
this equipment. Precision boring,
contouring, turning, facing and
grooving are mentioned, together
with straight boring, plunge-facing
and chamfering operations. Sketch-
es picture how contour machining
is applied. *Ex-Cell-O Corp.*

For free copy circle No. 7 on postcard, p. 93

Polyester film

A new booklet showing latest commercial uses and detailed physical and chemical properties of Mylar polyester film has been issued. Illustrated by numerous photographs and charts, the booklet cites many examples of industries where this versatile plastic film is used. Included is a chart detailing the characteristics of Mylar's insensitivity to moisture, resistance to solvent and chemical attack, wide temperature operating range, plus greater tensile strength than any other plastic film. *E. I. DuPont de Nemours & Co.*

For free copy circle No. 8 on postcard, p. 93

Water softeners

Water softeners, for industrial plants, institutions, and commercial establishments, are described in a bulletin just issued. Cutaway drawings illustrate the construction of the softeners and indicate the simple connections by which a softener is fitted into a water system. The capacities of various models are given, together with other specifications of each model. *Hagan Corp.*

For free copy circle No. 9 on postcard, p. 93

Trackmobile

Results of field tests on a new trackmobile are now available in a fully illustrated 6-page folder. The report covers a 2½-year period, during which time the machine underwent tests under actual operating conditions in major plants representing a wide cross-section of industry, such as steel, paper-making, metal fabrication and motorized equipment manufacturing plants. It also explains the machine's history and development. *Whiting Corp.*

For free copy circle No. 10 on postcard, p. 93

Buffing, polishing

Characteristics and uses of over 100 buffing and polishing compounds are described and illustrated in a new bulletin. The 24-page, 2-color bulletin contains a full-page chart which recommends cutting, coloring and double duty compounds. *Hanson - Van Winkle-Munning Co.*

For free copy circle No. 11 on postcard, p. 93



New Handling System increases production while eliminating two lines

In one of the automotive industry's newest plants, production of frames for 1955 models was lagging, even though 6 lines were being used. Then Planet engineers were consulted.

They designed and installed a new frame handling system which exceeds current production requirements, doubling the output of the old-style line. Now only 4 lines are used. In addition, quality has been improved.

Here's how the system operates. The component parts of the frame are delivered by trolley conveyor to a frame assembly conveyor where they are automatically positioned for tack welding. The assembled frame is then discharged on to the frame welding conveyor illustrated above.

Here the frames are automatically rotated, 90° at a time so that all finished welding is done on a horizontal plane as the frames move by each welding station. Frames are then automatically conveyed through checking, cleaning, and painting operations.

If you have a production problem, why not consult Planet Corporation engineers? Write or phone today. There is no obligation.

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**Light Weight—Heavy Duty
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Capacities from 1/4 to 10 tons**

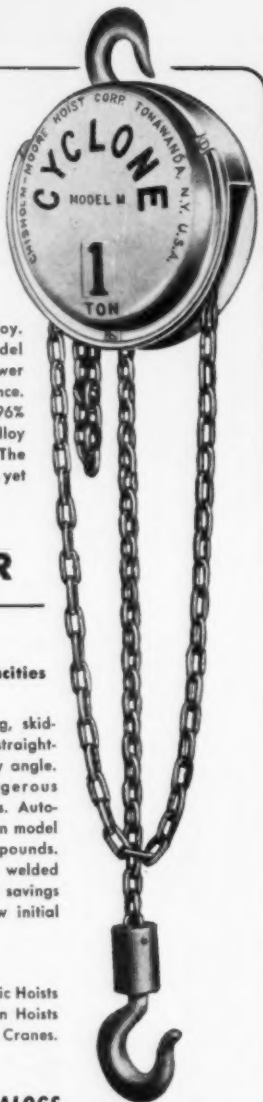
Made of tough aluminum alloy. Carries with ease. 1 ton model weighs only 36 pounds. 42% fewer parts. Requires little maintenance. Sealed-in lifetime lubrication. 96% efficient. Equipped with CM-Alloy flexible welded load chain. The best there is in hand hoists...yet reasonably priced.

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FREE TECHNICAL LITERATURE

Drill, tap units

A new drill catalog, covering a line of drilling and tapping units and accessories, offers a guide to evaluating and improving automatic drilling and tapping set-ups. The first 8 pages of the 24-page, 2-color booklet are devoted to helping manufacturers evaluate their basic tool requirements for automatic drilling, tapping, reaming and other operations. *Dumore Precision Tools.*

For free copy circle No. 12 on postcard, p. 93

Alloy products

A new catalog, No. G-10, covers both heat- and corrosion-resistant fabricated alloy products with more than 200 illustrations and accompanying descriptions. Included are sections on furnace muffles, furnace trays and fixtures, retorts and pit-type furnace equipment, salt bath equipment, tanks and sinks, pickling equipment, processing equipment and plating room equipment. Illustrations also include a number of massive and complex fabrications in muffles, furnace linings, retorts and tanks representing advances in design engineering and performance. *Rolock, Inc.*

For free copy circle No. 13 on postcard, p. 93

Chemicals

A new 6-page, 2-color bulletin, C197R, describes characteristics and uses of an extensive line of chemicals and other products derived from tin, antimony and zirconium. Product groups discussed include inorganic and organic tin chemicals, organotin stabilizers, stannous soaps, antimony chemicals, zirconium products and various metals and alloys. Several newly introduced tin derivatives are grouped separately. *Metal & Thermit Corp.*

For free copy circle No. 14 on postcard, p. 93

Piping

A company's skills in the fabrication and erection of low and high pressure piping are described and illustrated in a new brochure. Examples are given of the firm's engineering services and its facilities while typical jobs, large and small, are pictured. *Mercury Piping Co.*

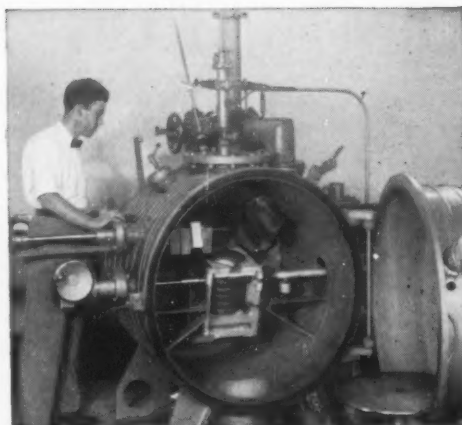
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The roaring gas turbines of 1000 mph jet planes use vacuum melted metal parts to withstand temperatures and stresses that would ruin conventional metal. If you use metal under severe conditions in your product . . . or require "cleaner" metals for smoother surfaces, you should be testing vacuum melted metals today. A high vacuum furnace will help you speed up these tests by supplying your researchers with a ready supply of varying alloys. We have made and operated more high vacuum furnaces than anyone in the world. Can we help you, too? Send coupon below today.



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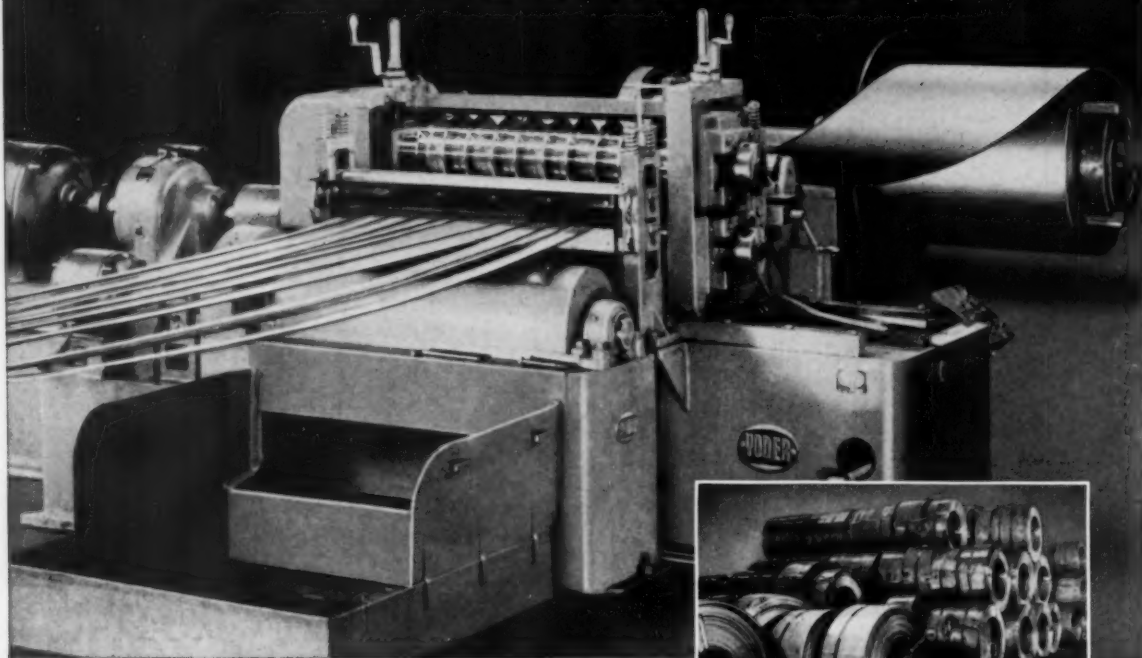
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January 12, 1956

YODER SLITTING LINES...



Standardized Series for LOW FIRST COST AND OPERATING COST!

A relatively small, low-cost Yoder slitting line offers attractive savings possibilities and high production in slitting small and medium coil sizes and strip gauges. Yoder has standardized a series of such machines, affording a rare combination of low cost and productive capacity amply sufficient for the needs of the great majority of sheet metal fabricators and custom slitting shops. Supplementing the standardized series are *special models for slitting big coils and heavy gauges at high speeds.*

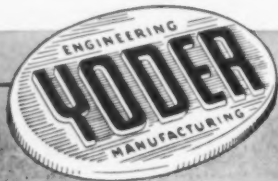
For requirements as low as 100 tons per month, one of the standardized Yoder slitting lines will pay for itself in short order. The savings PER

TON increase rapidly with decrease in coil size and width of strands to be slit.

Another important advantage gained by fabricators having their own slitter is the ability, from a relatively small stock of standard width coils, to meet expected and unexpected needs for slit strands in a few hours. This means easier production planning and greatly reduced strip inventories, in addition to lower prices and quicker deliveries of their strip purchases.

Yoder Slitter Book contains basic information on the economics and mechanics of slitter operation, with time and cost studies, production records and other valuable data. Send for it.

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FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 88

Carbide tips

Designed to guide selection of the proper nose radii on carbide tips is a new 4-page booklet, entitled "What Size Nose Radius?" Pointing out that the nose radius is usually the last item mentioned in any description of a tool, and that seldom is any information given about it, the folder discusses the relationship between nose radius and carbide tool wear. *Adamas Carbide Corp.*

For free copy circle No. 16 on postcard

Chain link

An instruction folder describes in detail the application and assembly of a new coupling link that enables alloy chain users to make up their own sling and special assemblies. The link consists of a pair of body halves, a tubular stud and a hardened alloy steel pin. *Columbus McKinnon Chain Corp.*

For free copy circle No. 17 on postcard

Turret drills

A company line of turret drills are described and illustrated in a new 4-page folder. Both hand operated and automatic hydraulic models are covered with a description of their features. *Burg Tool Mfg. Co.*

For free copy circle No. 18 on postcard

Kettles

Galvanizing kettles, tinning kettles, one ton containers, and related products are described in a well-illustrated, 12-page folder. The construction methods and quality control standards employed by the firm are also highlighted. *The Columbiana Boiler Co.*

For free copy circle No. 19 on postcard

Induction heating

A new bulletin on high frequency induction heating includes information on heat treating, joining and hot forming; heating stations, output transformers, motor generator sets; generator control units; charts on current penetration in steel and equipment for heating steel above Curie; also a helpful check list of value to those interested in induction heating. *Magnethermic Corp.*

For free copy circle No. 20 on postcard

Diamond tools

A new 6-page bulletin shows how a firm's method of mounting diamonds permits use of stones 2/3 smaller than previously used. Result of "fusing" diamond to tool shank is described. *Permatatch Diamond Tool Co., Inc.*

For free copy circle No. 21 on postcard

Metalworker

A new circular has been released describing a metalworking machine called the "Little Blacksmith." Detailed are the attachments available for the unit including an angle shearer, a notcher, a punch, a straight shearer, a straight shank punch and a bending die. *J. F. Kidder Mfg. Co., Inc.*

For free copy circle No. 22 on postcard

Conveyor carriers

A company line of conveyor belt carriers is described and illustrated in Bulletin 355. Covered are ball bearing carriers, simplex carriers, deep-trough carriers, rubber-roll impact carriers, and automatic belt-training carriers, as well as related products. *Stephens-Adams Mfg. Co.*

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31	32	33	34	35	36	37	38	39	40
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51	52	53	54	55	56	57	58	59	60

If you want more details on products advertised in this issue fill in below:

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Bender

Four-page folder describes and illustrates a new bar joist web bending machine which bends the complete web section and releases it in a single operation. Detailed information is given on the unit's controls, power supply, cylinders, chain drive and bending arms. Weight and dimensions are included. *Eidal Mfg. Co., Inc.*

For free copy circle No. 24 on postcard

Grapple, magnet

Combination grapple and magnet gives two to three times as much pickup capacity as grapple, magnet or clamshell bucket alone. Helps speed scrap handling operations. Designed for handling baling material, small loose material, prepared scrap, or for clean-up. Can be used as magnet, or as grapple, or both at same time. Unit designed to fit 8-ft truck body. For information write *M. P. McCaffrey, Inc.*

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Drill, tap unit

A new heavy duty drilling and tapping machine with many advanced design features such as infinitely variable speeds to 2000 rpm, standard equipment back gear, and extra heavy ribbed table and pedestal for long run production rigidity and accuracy is described in Bulletin 170. *Edlund Machinery Co.*

For free copy circle No. 26 on postcard

Flexible hose, ducts

Bulletin 60 describes and gives pricing information on a company line of hose and ducts for moving air, dust, fumes and materials via pressure, suction and gravity. *The Flexaust Co.*

For free copy circle No. 27 on postcard

Triple action presses

A new bulletin has been prepared which illustrates and describes a line of triple action presses designed for work on automotive press stamping lines. Discussed in the material is a press mechanism which allows a fast advance, slow draw and fast return aimed at speeding production. *Hamilton Press Div., Baldwin-Lima-Hamilton Corp.*

For free copy circle No. 28 on postcard

Heavy duty lathe

A heavy duty lathe is described in a new 20-page, 2-color bulletin that has just been issued by a manufacturer of engine lathes and ram-type milling machines. Twelve important features of the 32 in. heavy duty lathe are presented and illustrated in detail. This new bulletin also points out the various spindle speeds, which are in true geometric progression. Operation, maintenance, controls, range of feeds and leads, power unit, micrometer cross feed positive stop, follow rest, steady rest, and drive plate are also described. Specifications of the lathe are presented while six other model heavy duty lathes are illustrated and briefly described. *Azelson Mfg. Co.*

For free copy circle No. 29 on postcard

Hydraulic presses

A complete hydraulic press line is described in a 6-page illustrated bulletin. The line includes four column presses, closed side presses, sliding-bed straightening presses, heavy duty industrial presses, adjustable bed gap presses, shop presses, bending presses, frame-straightening presses, and forming, blanking and drawing presses. *K. R. Wilson, Inc.*

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Drilling machines

Catalog D-143 supplies complete information on a 21 in. stationary head floor drill. Included are specifications and floor plan, installation, lubrication, operation, and parts list. *Cincinnati Lathe and Tool Co.*

For free copy circle No. 31 on postcard

Power unit

Available models, together with operating features and specifications for a power unit designed to provide 60.0 max. bhp at 1800 rpm are contained in an 8-page folder. Discussed in detail are such features as the unit's removable valve guides and cylinder liners, its protection against dirt and grime, power take-off shaft, governor for close speed regulation, and gear driven oil pump. *Allis-Chalmers Mfg. Co.*

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matchless performance

**in Die Steels
for Cold Work**

because of

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The non-deforming, oil-hardening steel that combines ease of machining with low hardening temperature. Fine performance on blanking dies, punches, gauges, bushings, etc.

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5% chromium, air hardening with minimum distortion. Provides toughness and better wear resistance for thread rolling dies, forming and blanking dies, knurls, punches, gauges.

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High carbon, high chromium alloy, air hardening. Affords exceptional resistance to wear, with long life on trimming die, lamination die, shear blade, coining die, roll, mandrel and other difficult assignments.

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Air or oil hardening. A high carbon, high chromium steel, highly wear resistant; properly selected for lamination dies, wear plates, slitting cutters, forming dies.

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Oil hardening. Unusual edge strength and wear resistance, with high hardness. Specify for taps, punches, spinning tools, slitters, blanking dies.

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Latrobe, Pennsylvania

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JOINING: Vacuum Brazing Gains

Product strength, ductility and uniformity among the advantages which are claimed for the process . . .

Better jet engine components can be obtained.

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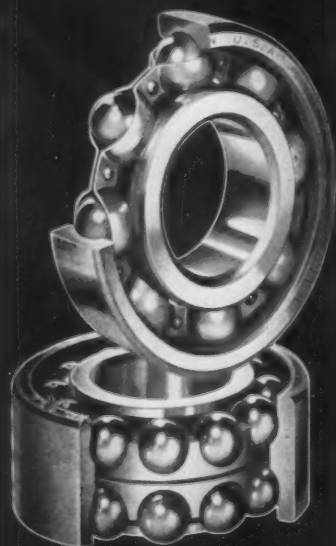


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*The Aristocrat of
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BALL BEARINGS:

AMERICA'S ONLY
BALL BEARING WITH
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**HOOVER BALL
AND BEARING COMPANY**
ANN ARBOR, MICHIGAN

Typical of the firms carrying on investigation in vacuum brazing is Pratt & Whitney's Aircraft Division of United Aircraft Corp., in East Hartford, Conn., where the process is used in the production of jet engine components.

By brazing under high vacuum, in an atmosphere free of oxidizing gases, a superior product, with greater strength, ductility, and uniformity, may be obtained according to Stokes Machine Co., makers of the equipment used by Pratt & Whitney.

The Connecticut aircraft engine builder is exploring the application of vacuum brazing to the production of jet engine components, such as fuel manifolds. Both test pieces and complete assemblies have been brazed under vacuum.

Get Tough, Ductile Joints

Pratt & Whitney's tests have shown that where copper was used as the brazing material, quantitative shear strengths of joints formed in stainless steel and nickel alloy test pieces by brazing in vacuum, hydrogen, and dissociated ammonia were similar, showing no pronounced superiority for the vacuum-brazed joints.

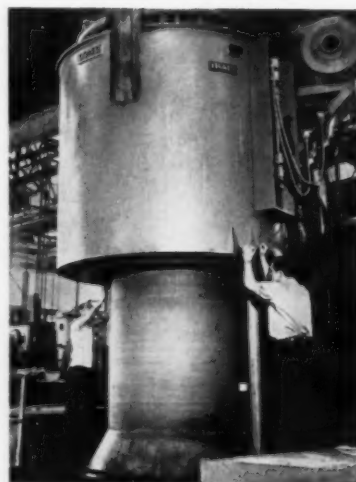
Peel tests showed that vacuum brazing of stainless steel to nickel-base alloy produced tough, ductile joints which were estimated to be more ductile than those obtained by brazing in normal atmosphere.

Procedure Described

For vacuum brazing, the components are mounted on suitable fixtures and wired for brazing. This involves placing one or two turns of brazing wire around each joint. They are then enclosed

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 93. Just indicate the page on which it appears. Be sure to note exactly the information wanted.



Double-shell chamber is lowered over retort for vacuum brazing.

within the furnace—a double-shell vacuum chamber which is lowered into position from overhead by means of vertical tubular guides. The space within the retort, or inner shell of the chamber, may be evacuated to a pressure of 0.05 micron or less.

Resistance - heating elements supported by the outer shell and located in the space between the two walls of the furnace, raise the internal temperature of the retort to about 2150°F. The brazing wire melts and infuses deeply into the tiny crevices of the joints between the tubes and the fittings of the

TECHNICAL BRIEFS

assembly. When it cools, the brazing metal solidifies and joins the several elements of the assembly together with strong, permanent joints.

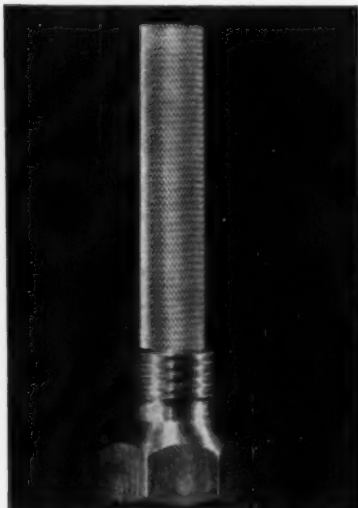
Duration of the vacuum brazing cycle is about a day and a half, or comparable to that with hydrogen-atmosphere brazing.

Forming:

**Strong mesh sections
made of sheet metal**

Expanded metal—in very small meshes suited for filter sections in industrial applications—is being produced by a French manufacturer, Le Metal Deploye. The product is a machine-made meshwork, cut and expanded out of rolled sheet metal into diamond-shaped meshes, with the junctions between the meshes remaining uncut.

Until now the material has been produced in meshes of various sizes and weight which were

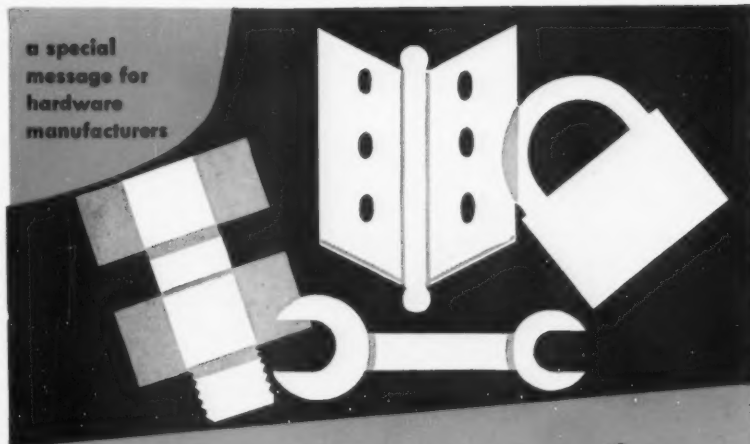


**Machine-made meshwork forms
filter section of a carburetor.**

rather large. The firm has now developed methods of producing a micro-expanded product which has a shortway of mesh from 0.0157 in. to 0.0787 in. and a longway of mesh from 0.0295 in. to 0.1181 in.

Two advantages cited are that meshes cannot be undone and stiffness is increased because the strands are bent upward.

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message for
hardware
manufacturers



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TECHNICAL BRIEFS

Atomic Energy:

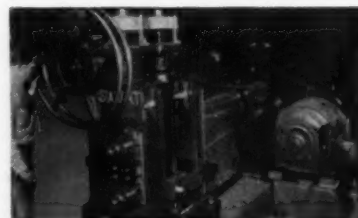
**Combination rolling mill
processes reactor parts.**

Figuring prominently in the pile metallurgy research work being done at General Electric Co's Hanford Atomic Products Operation in Richland, Wash. is a unique 2-high/4-high combination rolling mill designed and built by Stanat Manufacturing Co., Inc., Long Island City, New York.

The mill is being used in the processing of materials to be used in nuclear reactors and excellent results in the metallurgical laboratory have already been attributed to the mill in the production of fuel elements and pile structural materials including zirconium, stainless steel and aluminum.

Used in Hot, Cold Reduction

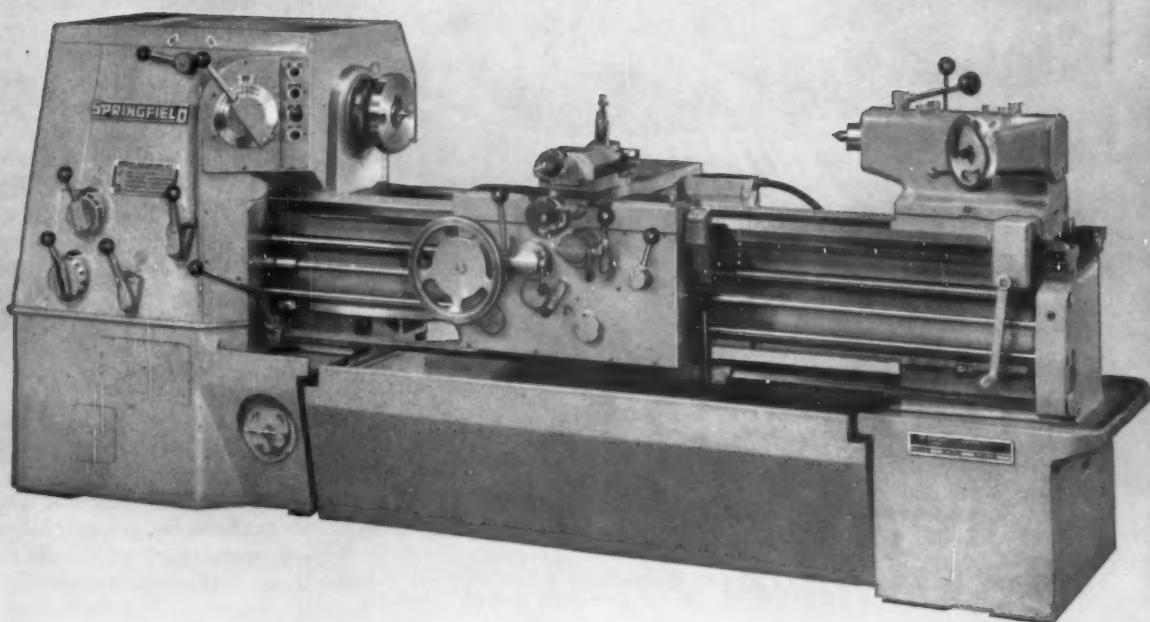
A scientific "work horse," the mill is employed in the hot or cold reduction of ingots and slabs of plain or clad metals and is also used in the cold reduction of strip to ultra-thin gages, accomplishing the work of two mills.



**Atomic research products are
processed in this rolling mill.**

Conceived as purely a 2-high/4-high combination mill, and not as an adaptation of either a 2-high or 4-high unit, the Stanat mill operates on the backup drive principle, which is said to permit the operator to completely convert from a 4-high to a 2-high setup or vice versa in only twenty minutes, allow heavy pass reductions without lateral "bowing out" of the work rolls and provide heavy rolling torque capacity aided by extra large universal spindles.

Depending on the laboratory's various applications, the mill is used as either a one-way or re-



more useful horsepower

All the horsepower in a Springfield Model "S" Lathe is productive.

A simple, straight-forward gear train, plus double-action lubrication, plus tight dynamic balance tolerances (.0005" displacement) eliminate friction and vibration, the twin horsepower thieves.

In the headstock, only the gears necessary to a given speed are engaged. Other gears run free with a stabilizing flywheel action, no drag on power.

A high pressure filtered oil mist keeps all gears and bearings drenched, and a cascade of oil lubricates the feed box.

Lathes: Engine and tool room, contouring and reproducing—swings 14" to 32".

Vertical Universal Grinders: swings 18" to 42".

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EVER SPENT!"**

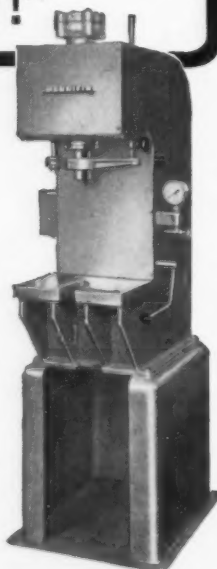
That's the price of this 5-Ton HANNIFIN Press*

A lot of production men have made such comments about this versatile little hydraulic press.

They like the way you can adjust it to the exact force you need for each job, all the way from 1 ton to 5 tons. The backstroke is adjustable, too, so the ram just clears the work on any job. Fast-acting controls. Prompt delivery from stock.

WRITE. Complete information and prices on the Hannifin line of 1- to 10-ton Hydraulic Presses will be sent on request.

*Price complete with motor and starter F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.



HANNIFIN

Hannifin Corporation, 513 S. Wolf Road, Des Plaines, Illinois

**"Four units of this type
being built for AEC . . ."**

versing unit. In the 2-high arrangement, the 8 in. by 8 in. backup rolls become work rolls for taking heavy bites. The mill is equipped with rotary unions and flexible hose lines and the backup rolls are internally bored for either water cooling or steam heating at all speeds.

Four combination rolling mills of this type are being constructed for installation at the Atomic Energy Commission's Argonne National Laboratory. They are being especially adapted for use in conjunction with hoods and remote control handling equipment to facilitate rolling of pyrophoric materials. Scheduled to begin operation early in 1956, the mills will constitute a major tool in the processing of plutonium containing fuel elements, which are so essential to the development and operation of fast breeder reactor power plants.

Casting:

**Zircon sands solve
mold problem.**

The use of zircon sands in the molds has solved the problem of rough surfaces in areas where excessive heat causes severe penetration in steel castings, National Supply Co. states. The penetration occurs in cores that are surrounded by a heavy section of metal, and in surfaces near the gate when a large casting requires a relatively long time for pouring.

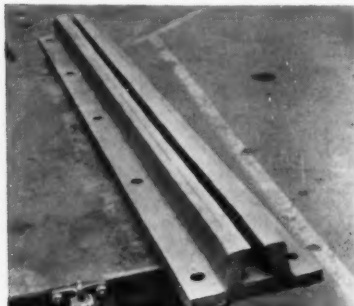
The greatest value of zircon sand, the company states, is in producing castings without burning in or having sand or core penetration. The cost of using zircon sand is minimized by using it sparingly. For example, in making a large core the face is lined with zircon sand about one inch thick and backed up with silica sand. This thickness has been found to be just as effective as greater thicknesses. Another factor in limiting the use of zircon sand is its low permeability which makes the release of gas from the

TECHNICAL BRIEFS

mold difficult if used over large areas.

Has Value to Users

There are several characteristics of zircon sand that contribute to its value to users of castings as well as to the foundry. These



Sand core in this cast steel rail was easily, cleanly removed.

include: a conductivity twice as great as that of silica sand, a high melting point of 4000°F or 3400°F with binders, one-third of the expansion of silica sand, excellent chilling properties, chemical stability, ease of removal from castings during shake-out, and fineness.

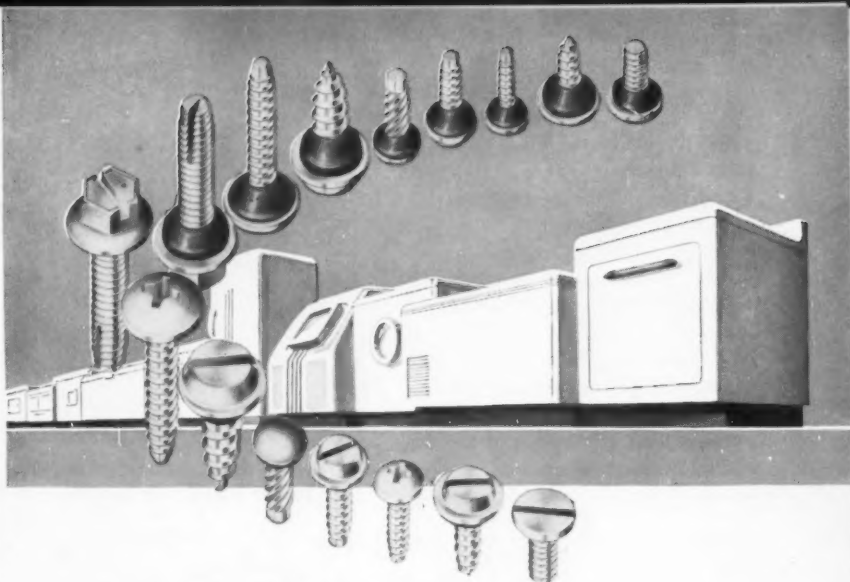
Methods:

Television plays role in controlling press

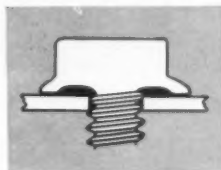
Control of a large forging press has been reportedly achieved through the use of a closed-circuit television system at the Aluminum Company of America's works in Cleveland.

The press, a 35,000 ton unit, is employed in forging parts for military aircraft used by the U. S. Air Force. Despite the press' great size, its action is extremely precise. Therefore off-center loading can interfere with the precision performance and may even damage the press itself. Since the parts being forged have complicated shapes, eccentric loading may occur.

The closed-circuit television system allows the press operator to see at all times whether the



New Tuff-Tite* Fastener Is Leakproof—Holds Securely —Protects Surfaces



Neoprene washer trapped under head seals hole—acts as cushion.

Tuff-Tite is a new multi-purpose fastener that gives tight, leakproof seating without cracking or chipping porcelain enamel and other fine finishes. It also dampens vibration by acting as a shock absorber and eliminating squeaks and chatter.

All this is accomplished by Tuff-Tite's one-piece metal head and assembled neoprene washer. When tightened, the neoprene is trapped and controlled by an undercut in the washer head.

**Trademark*

The neoprene is forced into the hole and around the threads to provide a cushion which protects the surface and forms a water-tight and airtight seal.

Tuff-Tite fasteners are used for quick, secure, leakproof fastening of metals and plastics. They are available as tapping screws, thread cutting screws, drive screws, machine screws, stove bolts, wood screws and special fasteners. They are made of carbon, alloy and stainless steel, aluminum, brass and other metals in a variety of head styles.

To learn more about how Tuff-Tite can give you leakproof surface protection with economy, use the coupon below.

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press is centrally loaded and to take immediate corrective action when off-center loading occurs.

The system operates in this fashion. The degree of deflection of the press platens is controlled by huge tie rods connected to four hydraulic cylinders at each corner of the press. Small hydraulic lines connected to the cylinders activate a gage, at the foundation of the press, which shows a spot of light within a diamond shaped pattern. If off-center loading occurs, the



TV screen helps operator correct off-center press loading.

spot of light moves toward a border of the diamond in the direction in which the off-center loading is occurring.

Camera Focused on Gage

An industrial television camera, approximately the size of a portable typewriter case, is also mounted near the press' foundation and is focused on the gage. A picture of the gage is picked up by the camera and relayed to a TV picture screen which can be seen by the operator. By watching the screen, the operator regulates the press. A television system is used because the press is so large and so shaped that the gage cannot readily be seen from the press control panel.

The camera is a product of the Allen B. Du Mont Laboratories, Inc.

Cleaning:

Rebuilding pickling crates doubles service life

Reconditioning fabricated Monel pickling crates that have been in daily service since 1928 has extended their anticipated life another 25 years. Savings amount to several thousand dollars, compared to the cost of new equipment.

The renovation job was performed for Sharon Steel Co., Sharon, Pa., by Strohecker, Inc., of Enon Valley, Pa. Rebuilding was a relatively simple job. It consisted mainly of taking the riveted crates apart, inspecting and reassembling the old members—this time by welding with Monel electrodes to make the joint as resistant to corrosion as the parent metal.

One-third the Cost

Cost of rebuilding each of the crates averaged somewhat less than one-third the cost of new equipment. This included new cross members where necessary, labor and shipping charges.

Crates are used for pickling carbon strip steel. Each 9½-ft long crate carries a batch load averaging between 8,500 and 10,000

LOOK AT THIS UP-TO-THE-MINUTE EXHIBIT OF

POPE PRECISION SPINDLES

EXHIBIT A

POPE SUPER-PRECISION, HEAVY DUTY BORING SPINDLES for boring holes round within millionths of an inch. Available in both belt driven and motorized units to meet a wide range of speeds and horsepower. Send us your specifications for quotations.



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POPE 1 HP, TOTALLY ENCLOSED 3600 RPM MOTORIZED, CARTRIDGE TYPE PRECISION SPINDLES with double row cylindrical roller bearings and separate thrust bearings for no endwise movement of the shaft

EXHIBIT D



POPE HEAVY DUTY, ¼ TO 100 HP DIRECT MOTORIZED SPINDLES for Horizontal or Vertical Skin Milling, Grinding, Milling, Boring and Other Operations

EXHIBIT F



POPE HEAVY DUTY VEE-BELT DRIVEN, PRECISION MILLING SPINDLES, and Wheel Heads, ½ to 50 HP

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POPE INTERNAL GRINDING SPINDLES for Bryant, Excello, Heald and Landis Grinders.

EXHIBIT C



NEW POPE QUICK, SELF-REMOVING WHEEL HOLDER for surface grinders and tool and cutter grinders — eliminates the necessity of a wheel puller. Write for quotations.

EXHIBIT E



POPE SUPER-PRECISION MOTORIZED TOOL AND CUTTER GRINDER SPINDLES with clearance Angle Swiveling Heads for Angular Adjustment in A Vertical Plane

EXHIBIT H



POPE SUPER-PRECISION HIGH FREQUENCY HEAVY DUTY GRINDING AND MILLING SPINDLES

for speeds up to 100,000 RPM

No. 107

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Specify

POPE

PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

lb, or five to six times the weight of the crate itself.

Nine Minute Dip

Sharon's pickling line is set up to handle three crates at a time. Each crate is submerged in the sulfuric acid pickling bath for about nine minutes. Depending upon the size of the strip steel, between 150 and 300 tons are pickled per eight hour shift.

As a regular part of the reconditioning, the Monel accessories, consisting of lift yokes, pins and yoke hooks were examined and replaced or straightened where necessary. These parts are usually repaired or replaced approximately every five years and are inspected periodically by Sharon while crates are in service.

In 1952, Sharon changed from cast alloy to wrought Monel for pickling combs and because of its toughness and resistance to pickling solutions, realized a substantial increase in service life.

This reconditioning and modernizing program has enabled the company to renew its pickling crates and accessories without delaying production. Periodic inspection of each crate insured against breakdown in service and, at the same time, made certain that equipment gave maximum safe service life.

Bonding:

Merry-go-round machine aids brake band production

High output of bonded automatic transmission bands is realized at the Muncie, Indiana, plant of Warner Gear Div., Borg-Warner Corp. using a single "merry-go-round" machine. Operation throughout the entire bonding cycle is fully automatic with the operator only having to load and unload parts.

The 30-station rotating machine used was designed and built by Modern Industrial Engineering Co., Detroit, Michigan, to handle two thicknesses of transmission brake bands. Time cycles as well as mandrel pressure and temperatures can be varied depending on

the thickness of the metal band on the part being bonded.

In bonding the transmission brake band with the thicker metal band, a part makes the complete cycle in 10 minutes, giving a production rate of 180 per hour. The parts with the thinner bands take 7½ minutes for a complete cycle with output totaling 240 parts per hour.

Machine uses regular plant air supply at 90 psi for clamping parts

during the bonding operation. An air regulator valve is provided for each station to control uniformity of the pressure and each station also has its individual adjustable temperature control.

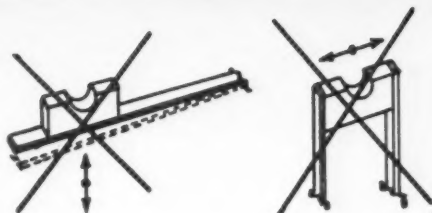
Total Shutdown Unnecessary

In the event that trouble develops at any station the machine does not have to be shut down so that necessary repairs can be made. Five control panels are pro-

NEW!! PIEZO CRYSTALS IN DYNAMIC BALANCING

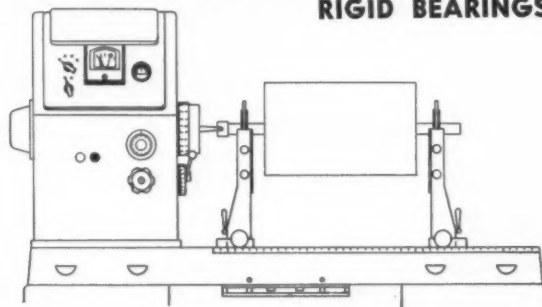
NO MORE

*Flexible and
Swaying Bearings
With Coils, Springs
or Dash Pots*



INSTEAD

PIEZO-ELECTRIC CIRCUIT and RIGID BEARINGS



RESULT: No trial and error runs . . . Only a single knob to adjust . . . Direct indicating of amount and location of unbalance . . . One-quarter minute balancing run . . . Utmost sensitivity

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WRITE FOR LITERATURE

TESTING EQUIPMENT CO., INC.

15 WILLIAM STREET

NEW YORK 5, N. Y.

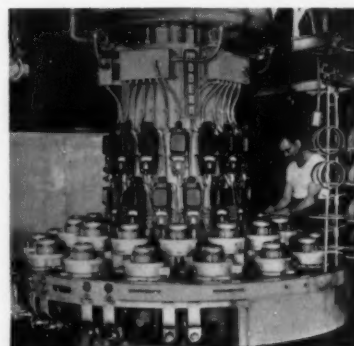
BOWLING GREEN 9-3658/9

"Stations can be repaired while others operate . . ."

vided, each handling six work stations. In this way a group of six stations can be taken out of service for repairs or maintenance while the other 24 stations are kept in production without interruption.

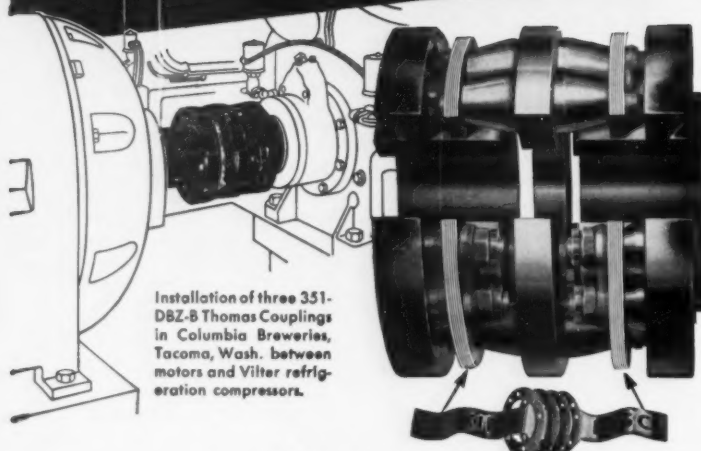
Adhesive coated molded brake band linings are placed into the metal bands for bonding and put

on the segmented mandrel by the operator at the start of the cycle. Air pressure applied through a cylinder at each work station forces jaws apart holding the lining to the metal band under heat and pressure. As the machine rotates, a cam releases the pressure temporarily allowing gases to escape and insuring a complete bond. At the completion of the cam travel the pressure is reapplied for the remainder of the bonding operation.



Parts make cycle in 7 to 10 minutes in brake band bonding.

THOMAS FLEXIBLE COUPLINGS... for more years of better service!



Installation of three 351-DBZ-8 Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

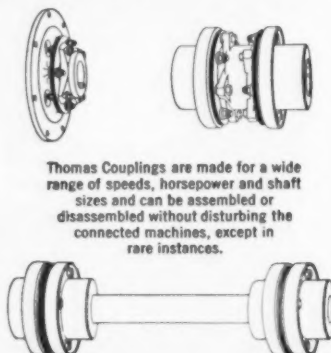
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

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NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

New Books:

"Torque Converters or Transmissions," by P. M. Heldt. Now in its revised fifth edition, this book provides latest information on transmissions for combustion engines, and deals particularly with changes brought about in automatic transmission design. A chapter on principles of hydrodynamics has been added and the chapter on hydromatic torque converters enlarged. Ample illustrated with charts, diagrams, photos. Chilton Co., Book Div., Chestnut & 56th Sts., Philadelphia. \$8.00. 496 p.

"Aircraft in Distress," by Harley D. Kysor. A handy manual of air survival procedures which should prove valuable to companies who operate their own planes. It's an interesting and authoritative book on every type of aircraft emergency, as seen through the pilot's eyes. Detailed attention is given to such subjects as air search and rescue, flying safety, emergencies and evacuation, rescue aircraft interception procedures, emergency landing procedures, aircraft ditching, and first-aid and survival. Chilton Co., Book Div., Chestnut and 56th Sts., Philadelphia. \$6.00. 432 p.

"Handbook of Barrel Finishing," by R. F. Enyedy. Gives complete details on this method of finishing metal and plastic parts. Gives

step-by-step details and includes more than 150 specification sheets for finishing a large variety of parts. Reinhold Publishing Corp., 430 Park Ave., New York 20, N. Y. \$7.50. 255 p.

"Metals Handbook—1955 Supplement." This addition to the ASM Metals Handbook has been designed to provide practical information on a wide variety of metalworking subjects that require up-to-date reference material. It contains 21 articles, gathered by 19 technical committees of the Society and representing the work of 179 authors. The topics treated in the four main sections of the book are metals and applications; design and application; processing; and fabricating. Pictorial treatment is used generously in the book which contains 411 illustrations, 256 charts and 214 tabulations. Published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3. \$6.00. 208 pp.

"Machining Kaiser Aluminum." First edition of a book designed to indicate variations in metal cutting methods as they apply to aluminum. Contents of the 307-page, well illustrated publication include sections on the general machinability of aluminum, as well as its milling, turning, drilling, reaming, tapping, boring, shaping, planing, broaching, grinding, filing, sawing and nibbling operations. Space is also devoted to cutting fluids for use on aluminum and a glossary of machining terms is included in the back of the book. Kaiser Aluminum & Chemical Sales, Inc., 919 North Michigan Blvd., Chicago 11.

"Foundry Practices," by S. E. Rusinoff. A comprehensive, practical text for men actually engaged in the metal casting industry as well as for students. Each subject is covered as a separate unit. Well illustrated, the book includes useful tables, a bibliography for those interested in further reading, and review questions at the end of each chapter. American Technical Society, 848 East Fifty-eighth St., Chicago 37. \$6.50. 261 p.

"Hydraulic and Pneumatic Power for Production," by Harry L. Stewart. A reference work for designers, buyers, installers and operators of hydraulic and pneumatic equipment for production machinery. Comprehensively written and well illustrated, it covers equipment, circuits and fluids. Its aim is to help the reader make the most of the advantages of fluid power, select the proper equipment for each applica-

tion, choose the right types of packings and seals, as well as the best kind of sequencing. In addition, it discusses the methods of analyzing equipment for accuracy of control, safety, and ease of operation; how to determine whether to use air or oil for a particular job; and how to maintain hydraulic and pneumatic equipment at top operating efficiency. The Industrial Press, 93 Worth St., New York 13. \$8.50.



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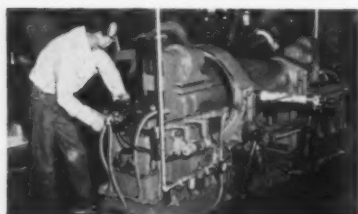
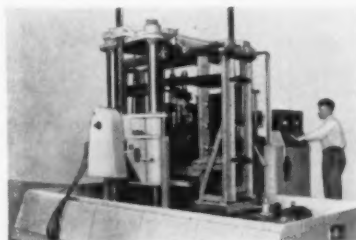
New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 93 or 94.

Speed and accuracy teamed in drilling machine

An electrically operated, hydraulically controlled drilling machine is reported to combine the speed of a two-way drilling machine having maximum flexibility with the accuracy of a horizontal boring machine. Multiple holes on closely spaced centers with selected drilling

patterns can be produced on tube sheets of ferrous and nonferrous materials up to 6 ft diam and 10 in. thick. Thinner sheets and baffles can be drilled in stacks up to 10 in. thick. Controls are conveniently mounted. *Walter P. Hill, Inc.*

For more data circle No. 33 on postcard, p. 93



Semiautomatic trimmer simplifies loading and unloading

A unique, semiautomatic trimming machine that requires only simple loading and unloading operations has been developed for cylindrical and elliptical tank production. The machine is sequenced so that, when operator has placed the tank tail

skins on the unit and placed holding clamps in position, a fly cutter, expanded by a pneumatic cylinder, moves into position and trims the skin from inside. *Pastushin Aviation Corp.*

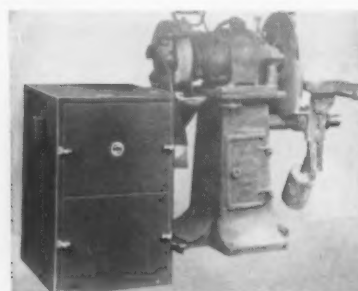
For more data circle No. 34 on postcard, p. 93

Fast, single-stage bending of bar joists

The entire center web section of a bar joist is automatically bent and released in a single cycle operation of less than a minute with a new bending machine. The machine handles rods up to $\frac{3}{4}$ in. by 30 ft, and

longer by extension and can be adjusted for web sections 8 by 10 in. up. It is designed to provide a maximum of 6000 bends per hour. *Eidal Mfg. Co.*

For more data circle No. 35 on postcard, p. 93



Dust collector has increased horsepower

Horsepower has been increased from $\frac{1}{2}$ to $\frac{3}{4}$ for higher over-all performance of this dust collector. The unit is recommended for use with double-end pedestal grinders having wheels up to 10 in. in diam, with single spindle disk grinders or sanders up to 18 in. in diam, and with tool and cutter grinders, pol-

ishing and buffing wheels, surface grinders and lathe operations involving cutting or grinding that creates noxious dust. Twenty-four cloth filters in the steel cabinet provide 60 sq ft of filtering area. It moves 500 cfm of air at 5700 fpm air speed. *Torit Mfg. Co.*

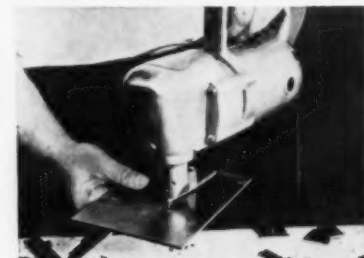
For more data circle No. 36 on postcard, p. 93

Portable nibbler precision cuts heavy gage sheets

Precision cutting of heavy gage sheet metals (ferrous and nonferrous) is claimed for a 13 lb portable nibbler. This heavy duty unit is rated to handle stainless steel of all types up to 10 gage; milder steels and nonferrous metals to 8 gage. The nibbler will follow pat-

terns or templates and will cut from any angle. It will also cut contoured or corrugated stock. Minimum cutting radius is 6 in. Cutting action is provided by a punch and die which takes a $\frac{1}{4}$ in. slug of metal with each stroke. *Fenway Machine Co.*

For more data circle No. 37 on postcard, p. 93

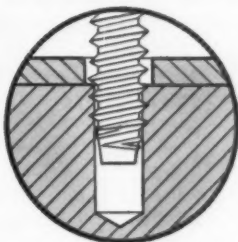


For Self-tapping Screws that...

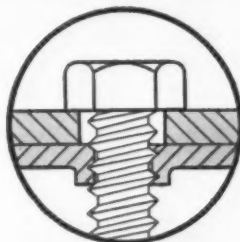
Start Right



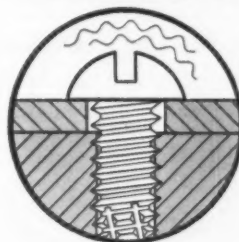
Drive Right



Seat Right



Stay Tight



Millions in savings made with P-K Screws since they were originated by Parker-Kalon have proved the Self-tapping Screw *method* reduces assembly costs.

But it takes more than the right method to make sure planned savings pay off. It takes P-K quality standards to guard against defective screws that cause assembly trouble, costly damage to parts, and hidden weakness that shows up in customer complaints.

Only Parker-Kalon can offer P-K quality, the indispensable extra, along with the proved advantages of Self-tapping Screws.

Plan your assemblies for lowest cost . . . a P-K Assembly Engineer will help you. Then make sure *planned savings keep on paying off* . . . when you purchase, order "P-K". Parker-Kalon Division, General American Transportation Corporation, Clifton, New Jersey.

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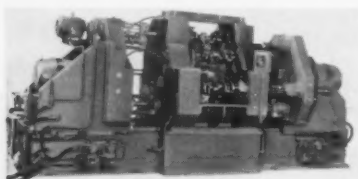
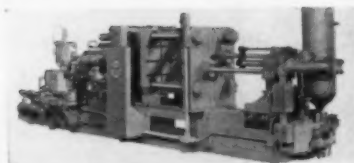
OK

Diecasting machines can add additional features

A new line of diecasting machines can be furnished as basic tools with only the essentials required for present production. Then, as requirements change, additional fea-

tures can be added quickly right at plant site. The machines are available in capacities of 250, 450, 650 and 850 ton. *Lake Erie Eng. Corp.*

For more data circle No. 38 on postcard, p. 93



Unit aids processing of engine crankshafts

Designed for processing crankshafts, a new machine drills, chamfers, finish reams, form seats and taps both ends of V-8 crankshafts. Developed to produce 100 crank-

shafts per hour, it's a double-end trunnion type machine, with pot-type heads, for inexpensive replacement. *Michigan Drill Head Co.*

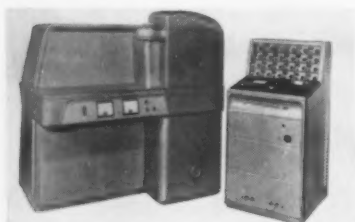
For more data circle No. 39 on postcard, p. 93

Liquid chillers offered in wide range of sizes

A wide range of capacities from 15 through 300 ton is provided in a new line of packaged liquid chillers. One group, the C series (complete with compressor), is available in capacities of 20 through 175 ton

and another group, the Series R (for remote compressor mounting), is available in capacities of 15 through 300 tons. *Acme Industries, Inc.*

For more data circle No. 40 on postcard, p. 93

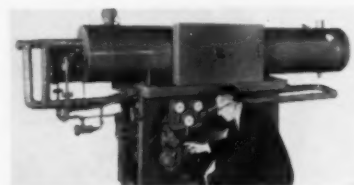


Spectrograph reports on presence of 71 elements

A new autometer, a multi-element indexing X-ray spectrograph, covers a range of 71 elements in the atomic scale and gives percentages of as many as 24 in a specimen. It has program selectors for indexing positions so that data on individual

elements may be obtained in sequential order. Any one or more of the positions may be by-passed in an analysis operation by switching off the proper selectors. *North American Philips Co., Inc.*

For more data circle No. 41 on postcard, p. 93



Chain-feeding conveyor may be stopped for processing

An electro-magnetically controlled chain-feeding conveyor is so designed that materials in process move at constant speed while in motion, but may be instantly stopped for processing operations. The con-

veyor is said to be easily adapted for feeding many types of sheet materials and assemblies on automated production or assembly lines. *Saranac Machine Co.*

For more data circle No. 42 on postcard, p. 93

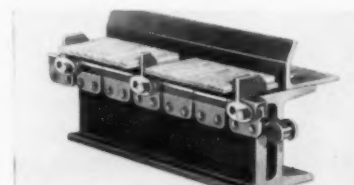


Dock leveler features automatic adjustment

Highlighting self-leveling fingers which compensate for out-of-level lateral tilt or height variation, a new dock leveler "floats" with truck-bed level during entire load-

ing operation. It also incorporates a 24 in. retractable lip for bridging gap between dock and truck bed. *Hartman Metal Fabricators, Inc.*

For more data circle No. 43 on postcard, p. 93



Marker prints on various shapes without adjustment

A new hand-type bar and tube printer is reported to print on flat, round and many-sided parts, from 5/16 in. up, without making a single adjustment. The unit can be

carried to the parts to be marked. Interchangeable wheels are provided for various sizes and styles of dies. *The Pannier Corp.*

For more data circle No. 44 on postcard, p. 93



Feeding table handles large sheets of aluminum

Eliminating flexing and bending of large aluminum sheets as they are processed, this unit has been devel-

oped so work is always even with bed of machine. *Raymond Corp.*

For more data circle No. 45 on postcard, p. 93

*SEE HOW *Controlled* PRESSURIZED LUBRICATION

GUARANTEES LOWEST COST SERVICE FROM

HOMESTEAD *lubricated* PLUG VALVES



1 This plug was removed from a Homestead Valve just after starting lubrication, and before all sealing areas were filled with lubricant. Note that pressurized lubricant continues to extrude through feeder holes. Momentary downward movement of plug at start of each lubrication, gives assurance that plug is always free to turn.



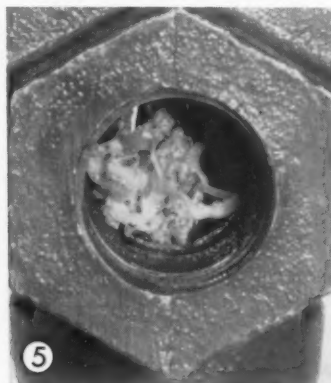
2 The plug was again withdrawn from the valve body just after a ring of lubricant around the stem indicated that the lubricant system was full. Note that all lubricant grooves are filled. The entire plug surface is coated with lubricant. Lubricant is well packed in the stem sealing area above the plug.



3 Now valve has been purposely over-lubricated as indicated by excess lubricant around stem. Note that with *controlled* pressurized lubrication there is no extrusion or seepage of lubricant into valve port opening. This means no waste, no contamination of line fluids, no clogging of low pressure lines with lubricant, or fouling of meters, orifices, etc.



4 Also, in the Homestead Valve with *controlled* lubrication, you will note that even though the valve has been over-lubricated, lubricant comes only to the bottom edge of the plug, and is not wasted by discharging in quantity into the bottom chamber.



5 Now, see for yourself the risk involved when a valve which does *not* have Homestead's *controlled* Pressurized Lubrication, is over-lubricated. Note lubricant has been forced into the port opening. It can contaminate line fluids, foul meters or orifices, or even block low pressure lines!

These are but a few of the many advantages of Homestead's controlled pressurized lubrication that guarantee lowest cost valve service.

Reference Book 39-5 has the full story—twenty-eight pages of engineering facts, sizes, types, dimensions, etc. Ask for your copy today. There is no obligation.

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Week in
Metalworking**

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NEW EQUIPMENT

Ultrasonic tester

A new ultrasonic-transmission testing device for detecting laminar flaws in metals and plastics, cupping in bolts, brazing defects and similar discontinuities has been developed. The part to be tested is

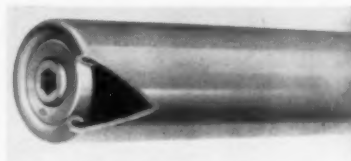


immersed in a liquid and continuous ultrasonic waves are passed through it from the transmitting transducer to the receiving transducer. Discontinuities reduce energy picked up and this reduction is registered. *Branson Instruments, Inc.*

For more data circle No. 46 on postcard, p. 93

Conveyor roller

Mounted on self-contained ball bearings, a new type end conveyor roller is designed to eliminate roller-caused damage to prod-



ucts, packages and cartons, as well as jamming and tieups. The unit houses its bearings in ends which are rolled inward to present smoothly rounded end surfaces. *Alvey-Ferguson Co.*

For more data circle No. 47 on postcard, p. 93

Thermocouple assembler

The aim of a new thermocouple connector system is to make possible the quick, easy assembly of almost any type of thermocouple used in plant or laboratory from a series of standard interchangeable parts. Inserts are available for various types of thermocouples in the following alloys: iron-constantan, chromel-alumel, platinum-platinum-rhodium and copper-constantan. *Marlin Mfg. Co.*

For more data circle No. 48 on postcard, p. 93

The Iron Age SUMMARY . . .

Auto production cutbacks have had little effect on steel demand . . . No significant easing expected until mid-year . . . Uncertain labor and price outlook.

The Pitch on Autos . . . Auto production cutbacks are having little immediate effect on demand for steel. Even if the decline is anything more than a flash-in-the-pan, it's not likely to show up in steel until March—if then.

What's happening is this: There have been some cancellations of steel orders by some car producers—to apply on deliveries scheduled for March. But these cancellations have been less than the cutbacks in car production in terms of tonnage.

Reason for this is that (1) The auto companies are using this breather to rebuild their inventories, and (2) some of them are arranging to divert tonnages to non-auto subsidiaries, such as appliances.

Net result is that other hopeful steel users are bruising their knuckles in vain as they rush the mills to demand tonnages the auto companies don't want. They're finding that Detroit is letting loose of very little.

Look at the Record . . . There will be no significant easing in the steel market picture before mid-year. With the general business outlook still on the rosy side, no steel consumer in his right mind is going to turn down an opportunity to add to his stockpile.

Overlooked in the excitement over the news from Detroit is the fact that mill backlogs are running to four months and incoming business is matching production. Allocations are still the rule—not the exception.

The uncertain steel labor outlook and the certainty of a steel price increase after the labor settlement—with or without a strike—also will affect the buying policies of consumers. Steel will be money in the bank until labor negotiations are out of the way.

Premium Prices . . . Despite the increase in steel capacity, the competition among mill product managers for a share of available ingots is terrific. Plates and structurals are the hottest items. The ten-day shutdown of a large plate rolling mill due to a motor failure compounded the hysterical plate market. Hot and cold-rolled sheets, bars and wire also continue in strong demand. Premium prices are still being paid by some consumers for plates and sheets, although conversion deals are not being pressed as urgently as before.

Based on the industry's new capacity of 128.4 million ingot tons, steel operations this week are scheduled at 98.5 pct of capacity, compared with 97 pct last week.

Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week	Last Week	Month Ago	Year Ago
Ingot Index (1947-1949=100)	2,425	2,388	2,425	1,978
Operating Rates				
Chicago	97.5	98.5	98.0	86.0
Pittsburgh	101.0	98.0*	103.0	79.0
Philadelphia	104.0	103.0	105.0	73.0
Valley	98.0*	96.0	99.0	78.0
West	97.5	97.5	101.5	89.0
Detroit	105.0	95.0	101.0	100.0
Buffalo	105.0	105.0	105.0	100.0
Cleveland	99.0	98.5*	100.0	85.0
Birmingham	95.0	95.0*	94.5	74.0
S. Ohio River	88.0	91.0	90.0	95.5
Wheeling	100.0	97.0*	107.0	99.0
St. Louis	99.0	102.0	107.0	78.0
Northeast	80.0	82.0	88.5	70.0
Aggregate	98.5	97.0	100.5	82.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.174	5.174	5.174	4.797
Pig Iron (Gross Ton)	\$59.09	\$59.09	\$59.09	\$56.59
Scrap, No. 1 hvy (gross ton)	\$53.67	\$53.33	\$52.17	\$34.33
Nonferrous				
Aluminum ingot	24.40	24.40	24.40	22.70
Copper, electrolytic	43.00	43.00	43.00	30.00
Lead, St. Louis	16.30	15.80	15.30	14.80
Magnesium	33.25	33.25	33.25	27.75
Nickel, electrolytic	64.50	64.50	64.50	64.50
Tin, Straits, N. Y.	107.00	109.00	109.50	86.125
Zinc, E. St. Louis	13.00	13.00	13.00	11.50

Battle for Ingots Is Heavy

Inter-company rivalry for available ingot supply is waxing hot and heavy . . . Struggle looms most noticeably in a tight steel market . . . New prices again make news.

♦ TUG-OF-WAR between steel company department heads to get their respective share of available ingots is waxing hot and heavy.

With only so many ingots available, and with perhaps as many as half a dozen or more departments gunning for the maximum ingot allotment, things are apt to get rough at times. In a tight market product such as now, competition inside a company is another major indication of the highly-competitive market condition.

This type of inter-company rivalry for available ingot capacity is something which is going on to some extent constantly. It shows up most noticeably, however, when steel is tightest and all product department heads are under pressure to meet increased consumer demands.

Crucible Steel Co. of America, Pittsburgh, has upped the base price of one of its high-speed steel grades to 99¢ per lb from 96¢.

The increase was made on Rex M-7 high-speed steel, used mainly for small cutting tools.

And, the Pittsburgh Screw & Bolt Co. announces that as of January 3, the heat treating extra for track bolts will be revised from .25 to .75, or an increase of 50¢ per cwt. The base price remains the same.

SHEETS AND STRIP . . . Continuing automotive cutbacks and reports of a return to normalcy in some auto producers' inventories spark most of the talk coming out of Detroit. While it's no secret that some cutbacks in automotive production have taken place, most of the major automakers are reportedly still pulling in sheet and strip at a fast clip. Obvious destination is inventory

stockpiling. Sheet and strip producers in Chicago are viewing all the talk about auto production cutbacks and current inventory buildups with a close eye right now. There's some speculation in the midwest that lighter automotive production (or talk of lighter production) from Detroit, might take some of the steam out of the hot demands for these products.

Word from Cleveland is that some of the independent auto stampers there have received a few cutbacks in orders from automakers. But, this is only a glimmer in the auto picture. These cutbacks amount to about 10 to 15 pct of total production—but—since output goals had been set about this much higher over fourth quarter '55 output, most producers feel the reductions are artificial. In reality, they point out, sheet and strip demands from the auto producers are just about the same as they were the second half of '55. In both Pittsburgh and the East, producers continue to strive to keep deliveries reasonably current. In Pittsburgh, most deliveries are running some 10 weeks behind. In the East, some producers are figuring in last quarter's carryovers with delivery time for first quarter '56. This, in turn, doesn't mean consumers are any more ahead in getting steel they need. But, according to some big eastern producers,

it could mean that they'll be current on deliveries by sometime in March.

STAINLESS . . . From Cleveland comes word that the current drive by several steel companies to get customers to use more substitutes which contain less nickel has fallen flat. Although difficult to produce, the substitutes use less allocated nickel. Some producers feel the substitutes are entirely adequate for many products where requirements are limited. Consumers, however, don't seem to agree and are so far resisting attempts by producers to use substitutes.

BARS . . . Stainless bar is now on allocation for May in Chicago. Result is that some consumers who had booked May tonnages in excess of their allotment are being cut back. Cold-finished bars, according to late reports in Chicago, are in poorer supply than they have been for some time. Some types of cold-finished bars are now stretching out to May and June deliveries. Pressure is still strong for hot top forging bars and 1 in. rounds in Detroit. Alloy bars have eased a little, although automakers are still taking delivery.

PLATE . . . Railroad carbuilding and linepipe programs are still drawing a bead on all the plate mills can turn out. In Chicago, plate continues to be the hardest-to-get-hold-of product in the entire lineup. Conversion deals, foreign purchases, and warehouse buying by normal mill customers are on the increase. In Pittsburgh, some mills are reporting linepipe backlogs well into 1957.

WIRE PRODUCTS . . . U. S. Steel Corp.'s new rod mill in Cleveland has started initial operation on tonnage for outside sale. The mill is already booked well into second quarter. Manufacturer's wire and rod are being sold on a distribution basis with deliveries out to about two months. Some spurt in both merchant and bailing wire sales is noted in recent weeks in all markets.

PRODUCTION NOTES . . . Mystic Iron Works, Everett, Mass., has shut down a blast furnace because of a failure in the lining. Specialists say it's unsafe to operate. It's estimated the works may be down four months before full production can be resumed. Lukens Steel Co.'s 206-in. plate mill, largest in the world, is back in operation after a 10-day shutdown brought on by motor failure.

Purchasing Agent's Checklist:

LABOR: Are you using your engineers to best advantage? . . . p. 31

INDUSTRY: This is a make-or-break year for steel producers . . . p. 35

RAW MATERIALS: What's bothering scrap men? . . . p. 36

TECHNICAL: Ceramic brazing jigs raise output . . . p. 71

Comparison of Prices

(Effective Jan. 10, 1956)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Jan. 10 1956	Jan. 3 1956	Dec. 14 1955	Jan. 11 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.325¢	4.325¢	4.325¢	4.05¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.05
Cold-rolled strip	6.29	6.29	6.29	5.79
Plate	4.52	4.52	4.52	4.225
Plates, wrought iron	10.40	10.40	10.40	9.30
Stainl's C-R strip (No. 302)	44.50	44.50	44.50	42.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	\$9.05	\$9.05	\$9.05	\$9.05
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.75
Special coated mfg. ternes	7.85	7.85	7.85	7.85
Bars and Shapes: (per pound)				
Merchant bars	4.65¢	4.65¢	4.65¢	4.30¢
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Structural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38.25	38.25	35.50
Wrought iron bars	11.50	11.50	11.50	10.40
Wire: (per pound)				
Bright wire	6.25¢	6.25¢	6.25¢	5.75¢
Rails: (per 100 lb.)				
Heavy rails	\$4.725	\$4.725	\$4.725	\$4.45
Light rails	5.65	5.65	5.65	5.35
Semifinish Steel: (per net ton)				
Re-rolling billets	\$68.50	\$68.50	\$68.50	\$64.00
Slabs, re-rolling	68.50	68.50	68.50	64.00
Forging billets	84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	96.00	96.00	96.00	86.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.025¢	5.025¢	5.025¢	4.675¢
Skelp	4.225	4.225	4.225	8.90
Finished Steel Composite: (per pound)				
Base price	5.174¢	5.174¢	5.174¢	4.797¢

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

	Jan. 10 1956	Jan. 3 1956	Dec. 14 1955	Jan. 11 1956
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	\$63.69	\$63.69	\$63.69	\$61.19
Foundry, Valley	59.00	59.00	59.00	56.50
Foundry, Southern, Cin'tl	62.93	62.93	62.93	60.43
Foundry, Birmingham	55.00	55.00	55.00	52.88
Foundry, Chicago	59.00	59.00	59.00	56.50
Basic, del'd Philadelphia	62.77	62.77	62.77	60.27
Pasic, Valley furnace	58.50	58.50	58.50	56.00
Malleable, Chicago	59.00	59.00	59.00	56.50
Malleable, Valley	59.00	59.00	59.00	56.50
Ferromanganese, cents per lb.	9.50¢	9.50¢	9.50¢	9.50¢
‡ 74.76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig Iron	\$59.09	\$59.09	\$59.09	\$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	\$53.50	\$53.50	\$53.50	\$36.50
No. 1 steel, Phila. area	55.50	54.50	51.50	32.00
No. 1 steel, Chicago	51.00	51.00	51.50	34.50
No. 1 bundles, Detroit	45.50	45.50	45.50	27.50
Low phos., Youngstown	59.50	55.00	55.00	36.50
No. 1 mach'y cast, Pittsburgh	55.50	55.50	54.50	42.50
No. 1 mach'y cast, Philadel'a.	57.50	56.50	56.50	42.00
No. 1 mach'y cast, Chicago	56.50	56.50	56.50	45.00
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	\$53.67	\$53.33	\$52.17	\$34.33
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	\$14.25	\$14.25	\$14.25	\$14.38
Foundry coke, prompt	16.25	16.25	16.25	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	43.00	43.00	43.00	30.00
Copper, Lake, Conn.	43.00	43.00	43.00	30.00
Tin, Straits, New York	107.00†	109.00	109.50	86.125
Zinc, East St. Louis	13.50	13.00	13.00	11.50
Lead, St. Louis	16.30	15.80	15.30	14.80
Aluminum, virgin ingot	24.40	24.40	24.40	22.70
Nickel, electrolytic	64.50	64.50	64.50	61.50
Magnesium, ingot	33.25	33.25	33.25	27.75
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.50
† Tentative. ‡ Average. * Revised.				

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

STAINLESS STEEL

←To identify producers, see Key on P. 124→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem B3	60.50	61.00	61.50	62.00	
Birdsboro, Pa. B6	60.50	61.00	61.50	62.00	
Birmingham R3	54.50	55.00*			
Birmingham W9	54.50	55.00*	59.00		
Birmingham U4	54.50	55.00*	59.00		
Buffalo R3	58.50	59.00	59.50		
Buffalo H1	58.50	59.00	59.50		
Buffalo W6	58.50	59.00	59.50	60.00	
Chester C17	60.50	61.00	61.50		
Chicago I4	58.50	59.00	59.50		
Cleveland A5	58.50	59.00	59.00	59.50	63.50
Cleveland R3	58.50	59.00	59.00		
Duluth I4	58.50	59.00	59.00	59.50	
Erie I4	58.50	59.00	59.00	59.50	
Everett M6		62.50	63.00		
Fontana K1	64.50	65.00			
Geneva, Utah C7	58.50	59.00			
Granite City G2	60.40	60.90	61.40		
Hubbard V1			59.00		
Lone Star L3		55.00			
Minnequa C6	60.50	61.00	61.50		
Monessen P6	58.50				
Neville Is. P4	58.50	59.00	59.00		
N. Tonawanda T1		59.00	59.50		
Pittsburgh U1	58.50			59.50	
Shapsville S3	58.50	59.00		59.50	
So. Chicago R3	58.50				
Steelton B3	60.50	61.00	61.50	62.00	66.50
Swedeland A2	60.50	61.00	61.50	62.00	
Toledo I4	58.50	59.00	59.00	59.50	
Troy, N. Y. R3	60.50	61.00	61.50	62.00	66.50
Youngstown Y1		59.00	59.50		

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct. \$2 per ton for 0.5 to 0.75 pct nickel, \$1 for each additional, 0.25 pct nickel. *Add \$1.00 for 0.31-0.69 pct phos.

Silvery Iron Buffalo, H1, \$68.75; Jackson, J1, G1, \$67.50. Add \$1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferroalloy prices are \$1 over comparable silvery iron.

Product	301	302	303	304	316	321	348	410	416	430
Ingot, re-rolling	17.75	19.00	—	20.25	31.50	25.00	33.75	15.00	—	15.25
Slabs, billets, re-rolling	22.25	24.75	26.75	26.00	40.25	32.00	43.00	19.50	—	19.75
Forg. discs, die blocks, rings	—	—	—	—	—	—	—	—	—	—
Billets, forging	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.00	26.00
Bars, wires, structurals	38.00	38.25	41.00	40.25	60.75	45.25	60.00	30.50	31.00	31.00
Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	32.25	32.25
Sheets	44.25	44.50	52.25	47.25	68.25	54.25	73.50	36.25	—	36.75
Strip, hot-rolled	32.00	34.50	—	37.25	58.25	44.25	50.75	—	—	—
Strip, cold-rolled	41.00	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; McKeesport, Pa., U1; Washington, Pa., W2, J2; Baltimore, Md., M2; Middletown, O., A7; Massillon, O., R3; Garv., U1; Bridgeville, Pa., U2; New Castle, Ind., I2; Ft. Wayne, J4; Philadelphia, D5.

Strip: Midland, Pa., C11; Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Leechburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Middletown, O., A7; Harrison, N. J., D3; Youngstown, C5; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (25¢ per lb higher); W1 (25¢ per lb higher); New Bedford, Mass., A6.

Bar: Baltimore, A7; Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1, F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T5; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monessen, P1; Syracuse, U1; Bridgeville, U2.

Structurals: Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11.

Plates: Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., I2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15; Philadelphia, D5.

Forged discs, die blocks, rings: Pittsburgh, C11; Syracuse, C11; Ferndale, Mich., A3; Washington, Pa., J2.

Forgings billets: Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11; Detroit, R5.

Prices Move Up Again

Steelmaking grades make fresh gains in Chicago and the East . . . Pittsburgh reports most prices holding . . . Strong resistance fails to depress market.

♦ SCRAP prices continue to move upward at the major centers. Chicago and Philadelphia report new gains. Pittsburgh prices are holding or advancing.

Increases come in the face of strong resistance. The market has wavered in spots and in Chicago old orders are confusing the picture. But generally speaking, the trend is still upward. There is more talk now of a turning point but so far, this is just talk.

Boston provides an example of what has been happening. Eastern Pennsylvania mills have been active there, joining export buyers and area consumers in moving the prices up. But a major area mill has been out of the market, living on inventory. Scrap people feel this mill must come in soon with tonnage orders and that any slack will be taken up by new orders from this source.

This sort of thing has been happening right along. The mills will hold off buying in the hope of driving prices down, but before sustained pressure can be applied, someone must place orders and replenish inventories. THE IRON AGE Composite for No. 1 heavy melting rose 34¢ to \$53.67.

Pittsburgh . . . The market remained firm for openhearth scrap with one sale of No. 2 bundles to a small independent mill reported at \$45. Sales of primary grades are still limited, but the major consumers are expected to enter the market momentarily. Prices are expected to be at least as high as current figures. Some brokers have reportedly paid as high as \$55 per ton for good No. 1 heavy melting. Blast furnace grades further reflected the overall strength of the market by jumping \$4 per ton on the latest sales of short turnings to the major consumers.

Chicago . . . Steelmaking grades showed signs of strengthening but most other categories are lagging. Indicative of the strength of the market was the purchase of a special lot of factory bundles at \$60 or \$4 over the open market price for dealer factory material, which is up \$1. Confusing the market are a number of "hold-over" orders moving at prices beneath the current market. Again, industrial No. 1 heavy melting moved up \$1, though activity in the dealer No. 1 heavy was holding back.

Philadelphia . . . On the basis of additional strength reflected in steel-making grades in an adjacent district, price of No. 1 heavy melting advanced \$1. Additional strength is also reported in blast furnace grades, up 50¢ over last week. New advances were also made in railroad specialties and in the cast market. Other grades are holding firm at earlier levels, with both brokers and dealers reporting a continuing strong level of market activity.

New York . . . Scrap prices in this area continue to climb for virtually all grades. Domestic orders are leading the advance, backstopped by export demand. While some brokers are confidently saying the top has not yet been reached, others in the trade are wondering if prices may not have gone up as much as can be expected, particularly for cast grades.

Detroit . . . Prices held firm and unchanged this week on the top melting grades. This, despite small purchases by two consumers at prices \$3 per ton higher. Brokers and dealers insisted that the higher prices were paid for small lots and did not constitute a true reflection of the market. A third mill bought a tonnage of No. 2 bundles at \$2 higher. Overall tone of the market is strong.

Cleveland . . . Mill resistance to local scrap price boom has cooled off

market somewhat following high bidding on industrial lists but underlying strength remains. Two Valley sales in past 10 days confirm present price on primary grades, and some is coming from Cincinnati. One lot of electric furnace steel went for \$60 and another Valley mill met the price with a token order. In Cleveland area industrial tonnage is being shipped to one local mill and other orders in the city and Valley are in the offing.

Birmingham . . . A large openhearth consumer who bought heavily just before the year end has held up shipments of scrap temporarily because of the heavy receipts immediately after the new year. Dealers say that although a good supply of all grades of scrap is coming into the yard, most of it is being shipped as soon as it is prepared. A few dealers, however, are shipping only limited amounts in order to build inventory.

St. Louis . . . The first week of 1956 found the scrap market strong with advances in some items based on buying prices announced by leading mills in the district. Shipments are equal to the melting. The following items are off: locomotive tires uncut \$3.50; heavy breakable cast off \$4; railroad specialties off \$2; and rerolling rails are off \$5. Consumers are top heavy on these items.

Cincinnati . . . Local market went up \$3 last week on basis of new sales by barge to Pittsburgh and by rail into Valley district. Yards are delivering in Pittsburgh for \$54 minimum with isolated lots going much higher. With \$7.20 freight into Valley, Cincinnati yards are delivering there for \$57.58.

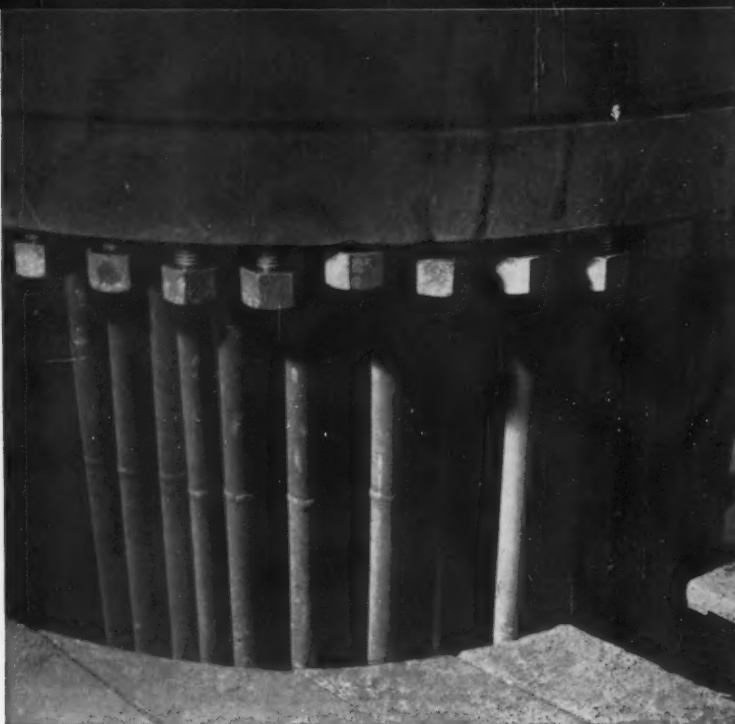
Buffalo . . . No. 1 heavy melting advanced \$2 per ton this week on the basis of new business. Secondary grades also advanced \$2. Reflecting strong market conditions, low phos was up \$3. Cast grades and short rails showed renewed strength.

Boston . . . Best steelmaking grades are up \$1 as export and domestic buying continues strong. Price of No. 2 bundles was incorrectly shown in Dec. 29, 1955, issue at \$42 to \$43. Price should have been \$36 to \$37.

West Coast . . . All's quiet on the western front. Mills are getting enough scrap to fill their immediate needs. They're reluctant to pile it on the ground at present high prices.



FOR SCUFF-RESISTANT BEAUTY. This Sunroc water cooler has, as standard equipment, a Stainless Steel kick plate for protection against scuffing and corrosion when floors are mopped. The deep drawn top is also made from Stainless. It's bright and inviting, and easy to clean.



FOR LONG, HARD SERVICE. Some of the Stainless Steel tubes in this bundle are 20 years old, despite the fact that they have been in continual service in a thermal cracking unit at a major southwestern oil refinery. Even though some of them have been lengthened by heliarc welding, they still retain their ability to handle corrosive products.

NOTHING *can equal* *Stainless Steel*



FOR SANITATION. This is a Stainless Steel rotary washer at a baby food plant of Gerber Products Company. Stainless Steel was used because of its great corrosion resistance, because it will not contaminate the food products, because it is so very easy to clean. Gerber's uses a lot of Stainless Steel processing equipment—including peelers, bins, steamers, holding tanks and filling machines.

• No other design material can match Stainless Steel in its *combination* of desirable properties: corrosion resistance, strength and hardness, beauty, cleanability and easy fabrication. When seeking a source of supply, remember that United States Steel offers the widest range of types, finishes and sizes available in the United States.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS
PIPE • TUBES • WIRE • SPECIAL SECTIONS



UNITED STATES STEEL

Pittsburgh

No. 1 hvy. melting	\$54.00 to \$55.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 bundles	54.00 to 55.00
No. 2 bundles	44.00 to 45.00
Machine shop turn	37.00 to 38.00
Mixed bor. and ms. turn	37.00 to 38.00
Shoveling turnings	41.00 to 42.00
Cast iron borings	41.00 to 42.00
Low phos. punch'g's plate	60.00 to 61.00
Heavy turnings	46.00 to 47.00
No. 1 RR. hvy. melting	58.00 to 59.00
Scrap rails, random lgth.	64.00 to 65.00
Rails 2 ft and under	69.00 to 70.00
RR. steel wheels	62.00 to 63.00
RR. spring steel	62.00 to 63.00
RR. couplers and knuckles	62.00 to 63.00
No. 1 machinery cast.	55.00 to 56.00
Cupola cast.	46.00 to 47.00
Heavy breakable cast.	45.00 to 46.00

Chicago

No. 1 hvy. melting	\$50.00 to \$52.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 factory bundles	55.00 to 56.00
No. 1 dealers' bundles	51.00 to 52.00
No. 2 dealers' bundles	41.00 to 42.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. forge crops	60.00 to 61.00
Low phos. punch'g's plate	57.00 to 58.00
Low phos. 3 ft and under	56.00 to 57.00
No. 1 RR. hvy. melting	54.00 to 55.00
Scrap rails, random lgth.	64.00 to 65.00
Rolling rails	73.00 to 74.00
Rails 2 ft and under	69.00 to 70.00
Locomotive tires, cut	58.00 to 59.00
Cut bolsters & side frames	59.00 to 60.00
Angles and splice bars	68.00 to 69.00
RR. steel car axles	68.00 to 69.00
RR. couplers and knuckles	59.00 to 60.00
No. 1 machinery cast.	56.00 to 57.00
Cupola cast.	52.00 to 53.00
Heavy breakable cast.	44.00 to 45.00
Cast iron brake shoes	41.00 to 42.00
Cast iron car wheels	50.00 to 51.00
Malleable	63.00 to 64.00
Stove plate	43.00 to 44.00

Philadelphia Area

No. 1 hvy. melting	\$55.00 to \$56.00
No. 2 hvy. melting	49.00 to 50.00
No. 1 bundles	55.00 to 56.00
No. 2 bundles	46.00 to 47.50
Machine shop turn.	37.00 to 38.00
Mixed bor. short turn.	37.00 to 38.00
Cast iron borings	37.00 to 38.00
Shoveling turnings	39.50 to 40.50
Clean cast chem. borings.	42.00 to 43.00
Low phos. 5 ft and under	57.00 to 58.00
Low phos. 2 ft and under	59.00 to 60.00
Low phos. punch'g's plate	59.00 to 60.00
Elec. furnace bundles	55.00 to 56.00
Heavy turnings	59.00 to 60.00
RR. steel wheels	59.00 to 60.00
RR. spring steel	59.00 to 60.00
Rails 18 in. and under	65.00 to 67.00
Cupola cast.	52.00 to 53.00
Heavy breakable cast.	53.00 to 54.00
Cast iron car wheels	58.00 to 59.00
Malleable	65.00 to 66.00
Unstripped motor blocks	39.00 to 40.00
No. 1 machinery cast.	57.00 to 58.00

Cleveland

No. 1 hvy. melting	\$54.50 to \$55.50
No. 2 hvy. melting	44.50 to 45.50
No. 1 bundles	54.50 to 55.50
No. 2 bundles	44.00 to 45.00
No. 1 busheling	54.50 to 55.50
Machine shop turn.	30.50 to 31.50
Mixed bor. and turn.	34.50 to 35.50
Shoveling turnings	34.50 to 35.50
Cast iron borings	32.00 to 33.00
Cut struct'l & plates, 2 ft & under	61.00 to 62.00
Drop forge flashings	54.50 to 55.50
Low phos. punch'g's plate	55.50 to 56.50
Foundry steel, 2 ft & under	55.00 to 56.00
No. 1 RR. heavy melting	55.00 to 56.00
Rails 2 ft and under	70.00 to 71.00
Rails 18 in. and under	71.00 to 72.00
Railroad grate bars	40.00 to 41.00
Steel axle turnings	34.00 to 35.00
Railroad cast.	55.00 to 56.00
No. 1 machinery cast.	55.00 to 56.00
Stove plate	53.00 to 54.00
Malleable	58.00 to 59.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	\$57.00 to \$58.00
No. 2 hvy. melting	46.50 to 47.50
No. 1 bundles	57.00 to 58.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	32.00 to 33.00
Shoveling turnings	36.50 to 37.50
Cast iron borings	36.50 to 37.50
Low phos. plate	59.00 to 60.00

Buffalo

No. 1 hvy. melting	\$49.00 to \$50.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 busheling	49.00 to 50.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	39.00 to 40.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. plate	54.00 to 55.00
Scrap rails, random lgth.	51.00 to 52.00
Rails 2 ft and under	65.00 to 66.00
RR. steel wheels	55.00 to 56.00
RR. spring steel	55.00 to 56.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast.	51.00 to 52.00
No. 1 cupola cast.	47.00 to 48.00

Detroit

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$47.00 to \$48.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 bundles, openhearth	47.00 to 48.00
No. 2 bundles	35.00 to 36.00
New busheling	47.00 to 48.00
Drop forge flashings	46.50 to 47.50
Machine shop turn.	23.00 to 24.00
Mixed bor. and turn.	26.00 to 27.00
Shoveling turnings	26.00 to 27.00
Cast iron borings	26.00 to 27.00
Low phos. punch'g's plate	50.00 to 51.00
No. 1 cupola cast.	46.00 to 47.00
Heavy breakable cast.	40.00 to 41.00
Stove plate	40.00 to 41.00
Automotive cast.	50.00 to 51.00

St. Louis

No. 1 hvy. melting	\$44.50 to \$45.50
No. 2 hvy. melting	41.00 to 42.00
No. 1 bundles	47.00 to 48.00
No. 2 bundles	37.50 to 38.50
Machine shop turn.	30.50 to 31.50
Cast iron borings	32.50 to 33.50
Shoveling turnings	32.50 to 33.50
No. 1 RR. hvy. melting	55.00 to 56.00
Rails, random lengths	60.50 to 61.50
Rails, 18 in. and under	66.00 to 67.00
Locomotive tires uncut	55.50 to 56.50
Angles and splice bars	59.00 to 60.00
Std. steel car axles	61.00 to 62.00
RR. specialties	58.00 to 59.00
Cupola cast.	53.00 to 54.00
Heavy breakable cast.	44.00 to 45.00
Cast iron brake shoes	42.00 to 43.00
Stove plate	44.00 to 45.00
Cast iron car wheels	50.00 to 51.00
Rolling rails	65.00 to 66.00
Malleable	50.00 to 51.00
Unstripped motor blocks	41.00 to 42.00

Boston

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$46.00 to \$47.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	46.00 to 47.00
No. 2 bundles	37.00 to 38.00
No. 1 busheling	46.00 to 47.00
Elec. furnace, 3 ft & under	50.00 to 51.00
Machine shop turn.	25.00 to 26.00
Mixed bor. and short turn.	27.00 to 28.00
Shoveling turnings	29.50 to 30.00
Clean cast chem. borings.	28.00 to 29.00
No. 1 machinery cast.	48.00 to 49.00
Mixed cupola cast.	42.00 to 42.50
Heavy breakable cast.	42.00 to 42.50
Stove plate	38.00 to 39.00
Unstripped motor blocks	27.00 to 28.00

New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$50.50
No. 2 hvy. melting	\$46.00 to 47.00
No. 2 bundles	39.50 to 40.50
Machine shop turn.	28.00 to 29.00
Mixed bor. and turn.	29.00 to 30.00
Shoveling turnings	30.00 to 31.00
Clean cast chem. borings.	32.00 to 33.00
No. 1 machinery cast.	50.00 to 51.00
Mixed yard cast.	47.00 to 48.00
Charging box cast.	47.00 to 48.00
Heavy breakable cast.	47.00 to 48.00
Unstripped motor blocks	32.00 to 33.00

Birmingham

No. 1 hvy. melting	\$45.00 to \$46.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	34.00 to 35.00
No. 1 busheling	45.00 to 46.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	19.00 to 20.00
Electric furnace bundles	48.00 to 49.00
Bar crops and plate	54.00 to 55.00
Structural and plate, 2 ft.	54.00 to 55.00
No. 1 RR. hvy. melting	51.00 to 52.00
Scrap rails, random lgth.	59.00 to 60.00
Rails, 18 in. and under	64.00 to 65.00
Angles & splice bars	61.00 to 62.00
Rolling rails	64.00 to 65.00
No. 1 cupola cast.	47.50 to 48.50
Stove plate	46.00 to 47.00
Charging box cast.	32.00 to 33.00
Cast iron car wheels	39.00 to 40.00
Unstripped motor blocks	39.00 to 40.00
Mashed tin cans	15.00 to 16.00

Cincinnati

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$49.00 to \$50.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	40.00 to 41.00
Machine shop turn.	33.00 to 34.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	36.00 to 37.00
Cast iron borings	30.00 to 31.00
Low phos. 18 in. & under	56.00 to 57.00
Rails, random lengths	61.00 to 62.00
Rails, 18 in. and under	68.00 to 69.00
No. 1 cupola cast.	46.00 to 47.00
Hvy. breakable cast.	44.00 to 45.00
Drop broken cast.	54.50 to 55.50

San Francisco

No. 1 hvy. melting	\$44.00
No. 2 hvy. melting	42.00
No. 1 bundles	43.00
No. 2 bundles	38.00
No. 3 bundles	29.00
Machine shop turn.	23.00
Cast iron borings	23.00
No. 1 RR. hvy. melting	44.00
No. 1 cupola cast.	50.00

Los Angeles

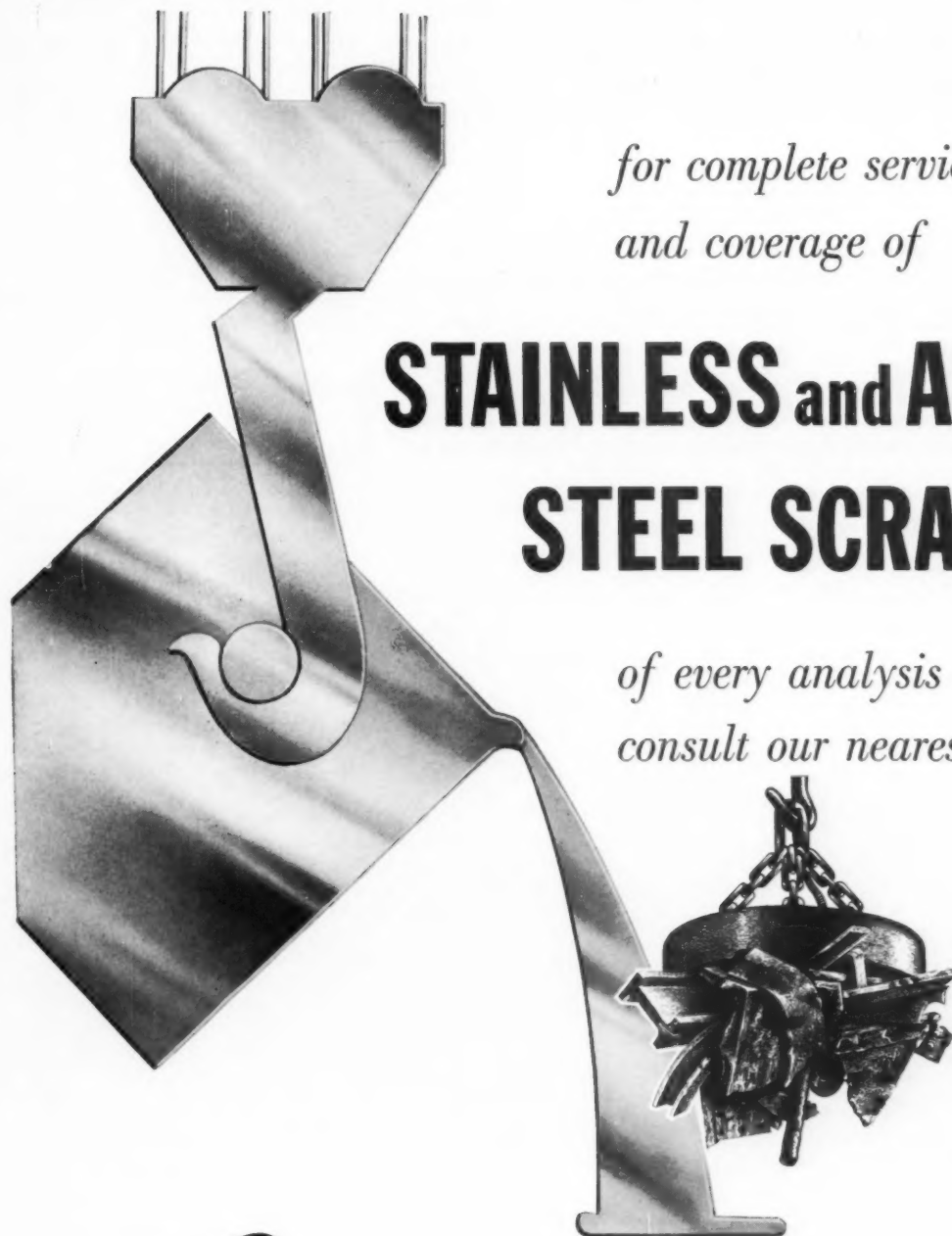
No. 1 hvy. melting	\$42.00
No. 2 hvy. melting	38.00
No. 1 bundles	41.00
No. 2 bundles	33.00
No. 3 bundles	29.00
Machine shop turn.	20.00
Shoveling turnings	23.00
Cast iron borings	20.00
Elec. furn. 1 ft and under	42.00
No. 1 RR. hvy. melting	42.00
No. 1 cupola cast.	48.00

Seattle

No. 1 hvy. melting	\$44.00
No. 2 hvy. melting	40.00
No. 2 bundles	34.00
No. 3 bundles	30.00
No. 1 cupola cast.	40.00
Mixed yard cast.	40.00

Hamilton, Ont.

No. 1 hvy. melting	\$43.50
No. 2 hvy. melting	39.50
No. 1 bundles	43.50
No. 2 bundles	36.00
Mixed steel scrap	37.50
Bushellings	33.50
Bush., new fact., prep'd	41.50
Bush., new fact., unprep'd	37.50
Machine shop turn.	16.00
Short steel turn.	25.50
Mixed bor. and turn.	\$16.00 to 17.00
Rails, rolling	52.50
Cast scrap	42.00 to 45.00



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Zinc Follows Lead Up

Pressure from Europe reflected on London market forces

U. S. zinc 1/2¢ higher . . . Increase aimed at preventing possible shortage . . . Chile situation getting critical.

♦ FROM ORE TO MARKET, zinc and lead go together. Therefore it came as no surprise to anyone when the zinc price followed lead and rose 1/2¢ to 13.50¢ per lb.

Reason behind the increases is simply the old law of supply and demand at work.

In both lead and zinc, the U. S. is the world's major source. However, in the last 10 years the tonnage of these two metals mined in this country has remained relatively constant. And the demand for both metals has increased.

This means that we have to supplement our supply with imported zinc and lead. In both cases the two major sources most readily available are Canada and Mexico. Both countries find the biggest markets for their minerals in the U. S. and in Europe. The amount of zinc and lead which goes to each is governed closely by price.

Recently reflecting an increase in European demand, the London market has been getting tighter. As the price offered in London outstripped the going price in this country, Mexican mines and other sources started thinking about sending more to London to take advantage of the higher price.

There actually was no shortage of either metal as such in the U. S. But the possibilities of shortages were strong unless

something was done to make it more profitable for foreign sources to continue to send their zinc and lead to the U. S. Hence the price increases, with the hope that it would offset the London bull market.

It is quite possible that both metals could increase in price again. However, since it will depend considerably on what action is taken on the London market to woo the zinc and lead producers, it can easily be spotted in advance.

Keep an eye on the London market. If zinc and lead prices keep heading up, watch for another possible increase.

COPPER . . . To all intents and purposes, the strike of the copper miners in the American subsidiary mines in Chile is over. The Anaconda operations are back in full swing and it won't be long before Kennecott will be able to say the same thing. Think copper supply may begin to loosen up? Don't hold your breath until it happens.

The Chilean Central Labor Union (C.U.T.) has called for a nationwide walkout to protest action by the government to freeze wages, prices and pensions. The copper workers from all reports will not be affected. They will be digging the ore. But it won't be going any place if all transportation and port workers are out on strike.

To say that it is highly possible that Communist influence is behind the

labor difficulties in Chile would merely be echoing official sentiment, both north and south of the border. The method employed of hitting first the mines, then shipping to insure an overlap of strikes, is typically Communist.

The move by President Ibanez to freeze wages and prices is basically economic. Chile has been in the throes of inflation for some time. The official rate of exchange of the Chilean peso runs 25 to 50 pct below the free money market.

The copper workers have a contract which calls for increases at the beginning of every year depending on an index. At the beginning of 1955 their wages went up a full 25 pct.

This latest strike move puts Ibanez' back to the wall. A great majority of the population do not understand the ruinous effects of the inflation. They will oppose any move that will inhibit increases in their wages.

Ibanez has thus far been master of every situation. If he can settle this difficulty he will be stronger than ever. His attempt is following his usual pattern.

First he dismissed the congress so that he could call a state of siege in the country without legislative approval. The police have arrested persons reputed to be leaders in the movement, including Clotario Blest, president of the C.U.T. and Juan Vargas, secretary. More arrests will follow and probably skirmishes between the army and strikers.

Ibanez will not spare the horses. This one is for keeps.

NICKEL . . . The government is now convinced that the shortage of nickel is not transitory. It is taking a careful, long-range look at the tight supply problem that confronts defense users and civilian fabricators alike.

John R. Townsend, The Sandia Corp., Albuquerque, N. M., has been appointed by Defense Mobilizer Arthur S. Flemming to conduct the detailed study. Mr. Townsend will analyze all government activities relating to nickel.

Because the shortage of nickel has a direct bearing on many defense orders, the Office of Defense Mobilization "forgave" nearly all scheduled deliveries of nickel to the government in 1955. Presumably, stockpiles of nickel were never very high, and the government now believes a rock-bottom examination of the problem to learn what substitutes, if any, can be developed to ease the pinch, is in order.

Daily Nonferrous Metal Prices

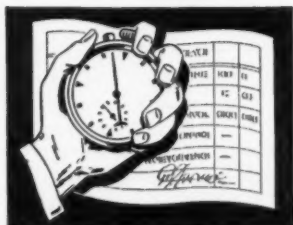
(Cents per lb except as noted)

	Jan. 4	Jan. 5	Jan. 6	Jan. 7	Jan. 9	Jan. 10
Copper, electro, Conn.	43.00	43.00	43.00	....	43.00	43.00
Copper, Lake, delivered	43.00	43.00	43.00	....	43.00	43.00
Tin, Straits, New York	108.75	108.00	107.25	106.75	107.00	107.00*
Zinc, East St. Louis	13.00	13.00	13.50	13.50	13.50	13.50
Lead, St. Louis	16.30	16.30	16.30	16.30	16.30	16.30

Note: Quotations are going prices

*Tentative

Faster Shearing at Follansbee



The addition of a big Steelweld Pivoted-Blade Shear in the Pittsburgh warehouse of Follansbee Metals, has greatly speeded the plate service they provide.

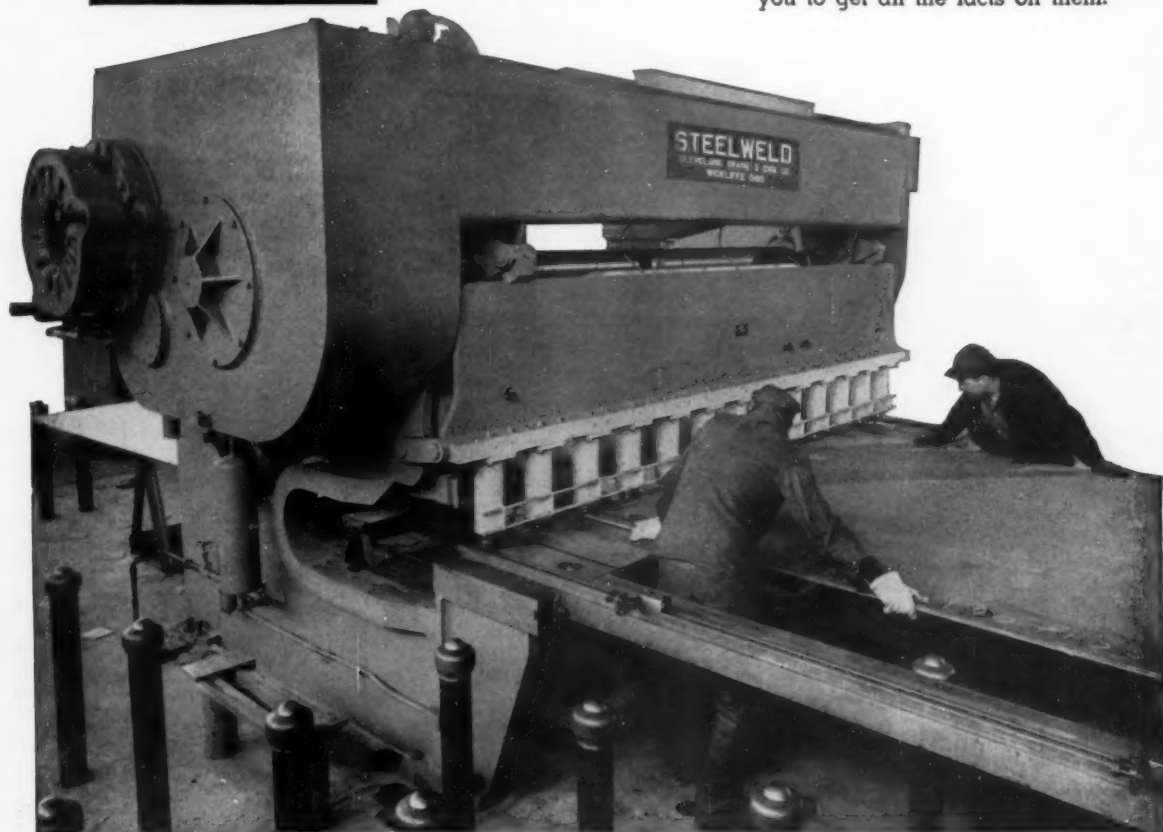
Hot rolled steel plates, stainless plates, floor plates and other metals are cut smoothly and accurately. The machine can handle mild steel up to 12'-0" x 3/4". The 36" deep throat permits slitting plates 72" wide down the middle for any length.

Because of the Micro-Set knife adjustment, it is quick and easy to properly set the knife clearance to obtain the best possible cut for every thickness. No other shear has this outstanding feature.

It was only after a thorough study of all makes of shears that Follansbee decided upon Steelweld. And it has fully proven up to expectations.

It makes the cuts as desired in metals of various characteristics. It is fast and easy to operate. All parts are readily accessible and the many adjustments provided minimize and simplify maintenance.

Steelweld Shears are the very latest and most modern on the market today with a host of points of superiority. We urge you to get all the facts on them.



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STEELWELD PIVOTED BLADE SHEARS

Nonferrous Prices (Effective Jan. 10, 1956)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3.
1100, 3003	40.8	38.7	37.5	36.5
5052	48.3	43.4	41.7	39.9
6061-0	45.4	41.2	39.4	39.3

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8	41.6-43.3	56.6-60.2
12-14	42.3-43.7	57.5-61.8
24-26	45.3-45.7	67.7-72.1
36-38	53.6-54.2	90.5-94.3

Screw Machine Stock—2011-T-3

Size"	1/4	3/8-5/8	3/4-1	1 1/4-1 1/2
Price	54.5	53.4	52.1	50.1

Roofing Sheet, Corrugated

(Per sheet, 26" wide, base, 16,000 lb)

Length" →	72	96	120	144
.019 gage	\$1.295	\$1.727	\$2.160	\$2.590
.024 gage	1.615	2.162	2.692	3.232

Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: FS1-O 1/4 in., 61¢; 3/16 in., 62¢; 1/2 in., 61¢; 0.064 in., 78¢; 0.032 in., 99¢. Specification grade higher. Base, 30,000 lb.

Extruded Round Rod: FS, diam 1/4 to 3.31 in., 82.5¢; 1/2 to 3/4 in., 66¢; 1 1/4 to 1.749 in., 60.5¢; 2 1/2 to 5 in., 57¢. Other alloys higher. Base up to 1/4 diam, 10,000 lb; 3/4 to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: FS. In weight per ft for perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 70.7¢; 0.22 to 0.25 lb, 5.9 in., 66.9¢; 0.50 to 0.59 lb, 8.6 in., 63¢; 1.8 to 2.59 lb, 10.5 in., 60.8¢; 4 to 6 lb, 28 in., 57.7¢. Other alloys higher. Base, in weight per ft of shape: Up to 1/2 lb, 10,000 lb; 1/2 to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: FS, 0.049 to 0.057 in. wall thickness: OD 1/4 to 5/16 in., \$1.625; 5/16 to 3/4 in., \$1.475; 3/4 to 1 in., \$1.105; 1 to 2 in., 92.5¢; 0.165 to 0.219 in. wall: OD 3/4 to 1 in., 75.5¢; 1 to 2 in., 71.5¢; 3 to 4 in., 70.5¢. Other alloys higher. Base OD: Up to 1 1/2 in., 10,000 lb; 1 1/2 to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	63.12	...	63.48
Copper, h-r	58.76	59.11	...
Copper, drawn	...	60.36	...
Low brass	56.55	56.49	...
Yellow brass	52.27	52.21	...
Red brass	58.09	58.03	...
Naval brass	52.83	49.94	48.40
Lead brass	...	...	48.42
Com. bronze	60.18	60.12	...
Mang. bronze	59.39	53.38	54.94
Phos. bronze	81.00	81.50	...
Muntz metal	53.74	49.55	50.80
Ni silver 10 pct	66.00	68.33	70.68
Beryllium copper Cr, 1.9% Be, Base	...	...	...
2000 lb, f.o.b.	...	...	...
Strip	...	...	\$1.84
Rod, bar, wire	...	...	1.81

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	102	83	99
Strip, CR	102	92	125
Rod, Bar, HR	87	74	93
Angles, HR	87	74	93
Plate, HR	97	87	95
Seamless Tube	122	110	153
Shot, Blocks	71	...	...

Titanium

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, \$13.10-\$13.60; alloy \$15.25-\$15.75; Plate, HR, commercially pure, \$10.50-\$11.00; alloy, \$11.50-\$12.00. Wire, rolled and/or drawn, commercially pure, \$9.50-\$11.50; alloy, \$11.50; Bar, HR or forged, commercially pure, \$7.90-\$8.15; alloy, \$7.90-\$8.10.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb.	...
Aluminum pig	24.40
Aluminum pig	22.50
Antimony, American, Laredo, Tex.	33.50
Beryllium copper, per lb conta'd Be	\$43.00
Beryllium aluminum 5% Be, Dollars	...
per lb contained Be	\$72.75
Bismuth, ton lots	\$2.25
Cadmium, del'd	\$1.70
Cobalt, 97-99% (per lb)	\$2.60 to \$2.67
Copper, electro, Conn. Valley	43.00
Copper, Lake, delivered	43.00
Gold, U. S. Treas., per troy oz.	\$35.00
Indium, 99.9%, dollars per troy oz.	\$2.25
Iridium, dollars per troy oz.	\$100 to \$120
Lead, St. Louis	16.30
Lead, New York	16.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig	32.50
Ingot	33.25
Magnesium, sticks, 100 to 500 lb.	53.00
Mercury, dollars per 76-lb flask, f.o.b. New York	\$280 to \$284
Nickel electro	64.50
Nickel oxide sinter at Copper Cliff, Ont., contained nickel	60.75
Palladium, dollars per troy	...
oz.	\$23 to \$24
Platinum, dollars per troy oz.	\$97 to \$107
Silver, New York, cents per troy oz.	91.00
Tin, New York	107.00*
Titanium sponge, grade A-1	\$3.15 to \$3.45
Zinc, East St. Louis	13.50
Zinc, New York	14.00
Zirconium, sponge	\$10.00

* Tentative

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot	42.00
No. 115	41.25
No. 120	41.25
No. 123	40.50
80-10-10 ingot	45.75
No. 305	44.00
No. 315	44.00
88-10-2 ingot	58.25
No. 210	54.75
No. 215	54.75
No. 245	48.75
Yellow ingot	33.25
No. 405	33.25
Manganese bronze	37.75
No. 421	37.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	32.75-34.00
0.30 copper max.	32.50-33.75
0.60 copper max.	32.50-33.75
Piston alloys (No. 122 type)	31.50-32.50
No. 12 alum. (No. 2 grade)	31.50-32.00
108 alloy	31.50-32.00
195 alloy	33.00-34.00
13 alloy (0.60 copper max.)	32.50-33.75
AXS-679	31.50-32.00

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97 1/2%	31.50-32.75
Grade 2—92-95%	30.50-31.75
Grade 3—90-92%	30.00-31.00
Grade 4—85-90%	29.25-30.25

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	39	28 1/4
Yellow brass	28 1/4	26 1/4
Red brass	34 1/4	33 1/4
Comm. bronze	35 1/4	35
Mang. bronze	27	25 3/4
Yellow brass rod ends	28 1/2	...

Custom Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	43
No. 2 copper wire	41 1/2
Light copper	39
Heavy yellow brass solids	34 1/2
Refinery brass	38 1/2-39

* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	44
No. 2 copper wire	41 1/2
Light copper	39
No. 1 composition	34 1/2
No. 1 comp. turnings	34 1/2
Heavy yellow brass solids	34 1/2
Brass pipe	29
Radiators	28

Aluminum

Mixed old cast	21 1/2-22 1/2
Mixed new clips	22-22 1/2
Mixed turnings, dry	21 1/2-22 1/2

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	41 1/2-42
No. 2 heavy copper and wire	38 1/2-39
Light copper	36-36 1/2
New type shell cuttings	36-36 1/2
Auto radiators (unsweated)	24-24 1/2
No. 1 composition	31 1/2-32
No. 1 composition turnings	29 1/2-30
Unlined red car boxes	24 1/2-25
Cocks and faucets	20-20 1/2
Clean heavy yellow brass	25 1/2-26
Brass pipe	25 1/2-26
New soft brass clippings	25 1/2-26
No. 1 brass rod turnings	23 1/2-24

Aluminum

Alum. pistons and struts	17-17 1/2
Aluminum crankcases	16 1/4-17 1/4
1100 (2S) aluminum clippings	20 1/2
Old sheet and utensils	16 1/4-17 1/4
Borings and turnings	11 1/2-15 1/2
Industrial castings	16 1/4-17 1/4
2024 (24s) clippings	18 1/2-19

Zinc

New zinc clippings	8-8 1/2
Old zinc	5 1/2-6
Zinc routings	4
Old die cast scrap	3 1/2

Nickel and Monel

Pure nickel clippings	\$1.50
Clean nickel turnings	\$1.25
Nickel anodes	\$1.50
Nickel rod ends	\$1.50
New Monel clippings	60
Clean Monel turnings	50
Old sheet Monel	55
Nickel silver clippings, mixed	25
Nickel silver turnings, mixed	21

Lead

Soft scrap lead	13-13 1/2
Battery plates (dry)	7 1/4-7 1/2
Batteries, acid free	4 1/2

Magnesium

Segregated solids	18 1/2-19
Castings	17 1/2-18

Miscellaneous

Block tin	81-82
No. 1 pewter	64-65
Auto babbit	43 1/2-44 1/2
Mixed common babbit	11 1/2-15 1/2
Solder joints	21-21 1/2
Siphon tops	47
Small foundry type	16 1/2-17
Monotype	15 1/4-15 3/4
Lino. and stereotype	14-14 1/2
Electrotype	12 1/2-13 1/4
Hand picked type shells	10 1/2-11
Lino. and stereo. dross	6 1/4-6 1/2
Electro. dross	5 1/4-5 1/2

IRON AGE

STEEL
PRICES(Effective
Jan. 10, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

	BILLETS, BLOOMS, SLABS			PIL- ING	SHAPES STRUCTURALS			STRIP					
	Carbon Re-rolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Hot- rolled	Cold- rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled
EAST	Bethlehem, Pa.		\$96.00 B3		4.65 B3	6.80 B3	4.65 B3						
	Buffalo, N. Y.	\$68.50 B3	\$84.50 R3, B3	\$96.00 R3, B3	5.45 B3	4.65 B3	6.80 B3	4.65 B3	4.325 R3,B3 6.25 B3 6.25 R7,S10	6.425 B3	9.10 B3		
	Claymont, Del.												
	Harrison, N. J.												13.45 C11
	Conschocken, Pa.							4.375 A2	6.30 A2	6.425 A2			
	New Bedford, Mass.								6.70 R6				
	Johnstown, Pa.	\$68.50 B3	\$84.50 B3	\$96.00 B3		4.65 B3	6.80 B3						
	Boston, Mass.								6.80 T8				13.80 T8
	New Haven, Conn.								6.70 D1 A5				
	Phoenixville, Pa.				5.15 P2		5.15 P2						
	Sparrows Pt., Md.							4.325 B3	6.25 B3	6.425 B3	9.10 B3		
	Bridgeport, Wallingford, Conn.	\$73.50 N8	\$89.50 N8					4.625 N8	6.70 W1			7.50 N8	
MIDDLE WEST	Pawtucket, R. I. Worcester, Mass.								6.80 N7 A5				A5 13.80 N7
	Alton, Ill.							4.50 L1					
	Ashland, Ky.							4.325 A7					
	Canton-Massillon, Dover, Ohio		\$86.50 R3	\$96.00 R3									13.45 G4
	Chicago, Ill.	\$68.50 U1	\$84.50 R3, U1,W8	\$96.00 R3, U1,W8	5.45 U1	4.60 U1, W8	6.75 U1, Y1	4.60 U1	4.55 A1 4.325 N4,W8	6.35 A1,T8		7.20 W8	13.45 T8
	Cleveland, Ohio								6.25 A5,J3		9.30 A5		13.45 A5
	Detroit, Mich.			\$96.00 R5				4.425 G3,M2	6.35 D1,D2, G3,M2,P11	6.525 G3	9.20 D2, G3		
	Duluth, Minn.												
	Gary, Ind. Harbor, Indiana	\$68.50 U1	\$84.50 U1	\$96.00 U1, Y1	5.45 J3	4.60 U1, J3	6.75 U1, J3	4.325 J3, U1,Y1	6.35 J3 6.25 Y1	6.425 J3, U1,Y1	9.30 Y1	7.20 Y1, U1	
	Sterling, Ill.							4.425 N4					
	Indianapolis, Ind.								6.40 C5				
	Newport, Ky.											7.20 N5	
WEST	Middletown, Ohio								6.45 A7				
	Niles, Warren, Ohio Sharon, Pa.	\$68.50 C10	\$84.50 C10	\$96.00 C10				4.325 S1, R3	6.25 S1, R3,T4	6.425 S1, R3	9.10 S1, R3	7.20 S1	13.45 S1
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$68.50 U1, J3	\$84.50 J3, U1,C11	\$96.00 U1, C11	5.45 U1	4.60 U1, J3	6.75 U1, J3	4.325 P6	6.25 S7,B4			7.20 S9	13.45 S9
	Portsmouth, Ohio							4.325 P7					
	Weirton, Wheeling, Follensbee, W. Va.					4.60 W3		4.325 W3	6.25 F3,W3	6.425 W3	9.10 W3		
	Youngstown, Ohio		\$84.50 C10	\$96.00 Y1, C10		4.60 Y1	6.75 Y1	4.325 U1, Y1	6.25 Y1,C5	6.425 U1, Y1	9.30 Y1	7.20 U1, Y1	13.45 C5
	Fontana, Cal.	\$76.00 K1	\$92.00 K1	\$115.00 K1		5.25 K1	7.40 K1	5.40 K1	5.875 K1	8.80 K1	7.525 K1	8.85 K1	
	Geneva, Utah		\$84.50 C7			4.60 C7	6.75 C7						
	Kansas City, Mo.					4.70 S2	6.85 S2			6.675 S2		7.45 S2	
	Los Angeles, Torrance, Cal.		\$94.00 B2	\$116.00 B2		5.30 C7, B2	7.45 B2	5.875 C7, B2	8.30 C1			8.40 B2	
	Minneapolis, Colo.					4.90 C6		5.425 C6					
	Portland, Ore.					5.35 O2							
SOUTH	San Francisco, Niles, Pittsburg, Cal.		\$94.00 B2			5.25 B2, P9	7.40 B2	5.875 B2, C7					
	Seattle, Wash.		\$98.00 B2			5.35 B2	7.50 B2	5.325 B2					
	Atlanta, Ga.							4.525 A8					
	Fairfield, Ala. City, Birmingham, Ala.	\$68.50 T2	\$84.50 T2			5.10 C16, 4.60 R3,T2	6.75 T2	4.325 R3,T2 4.825 C16		6.425 T2			
	Houston, Lone Star, Tex.	\$74.50 L3	\$89.50 S2	\$101.00 S2		4.70 S2	6.85 S2			6.675 S2		7.45 S2	

IRON AGE

STEEL
PRICES(Effective
Jan. 10, 1956)

Italic identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

	SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
	Hot-rolled 16 ga. & hevy.	Cold- rolled	Galvanized 16 ga.	Enamel- ing 12 ga.	Long Tens 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot- rolled 19 ga.		Coke* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.
EAST	Bethlehem, Pa.												
	Buffalo, N. Y.	4.325 B3	5.325 B3			6.375 B3	7.875 B3			5.375 W6	† Special coated mfg. terms deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct \$2.20 from 1.25-lb. coke base box. * COKE: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add \$1.00. Differ- ential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conschocken, Pa.	4.375 A2	5.375 A2			6.425 A2							
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johantown, Pa.									5.025 B3			
	Fairless, Pa.	4.375 U1	5.375 U1			6.425 U1	7.925 U1				\$9.30 U1	\$8.00 U1	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	4.325 B3	5.325 B3	5.85 B3		6.375 B3	7.875 B3	8.60 B3		5.125 B3	\$9.30 B3	\$8.00 B3	
MIDDLE WEST	Worcester, Mass.									5.325 A5			
	Trenton, N. J.												
	Alton, Ill.									5.20 L1			
	Ashland, Ky.	4.325 A7		5.85 A7	5.90 A7								
	Canton-Maxwell, Deer, Ohio			5.85 R1, R3									
	Chicago, Joliet, Ill.	4.55 A1 4.325 W8				6.375 U1				5.025 A5, N4, R3			
	Sterling, Ill.									5.125 N4			
	Cleveland, Ohio	4.325 J3, R3	5.325 J3, R3		5.90 R3	6.375 J3, R3	7.875 J3, R3			5.025 A5			
	Detroit, Mich.	4.425 G3, M2	5.425 G3 5.325 M2			6.475 G3	7.975 G3						
	Newport, Ky.	4.325 N5	5.325 N5	5.85 N5									
	Gary, Ind. Harbor, Indiana	4.325 J3, U1, Y1	5.325 J3, U1, Y1	5.85 U1, J3	5.90 U1, J3	6.25 U1	6.375 Y1, U1, J3	7.875 U1, Y1		5.025 Y1	\$9.20 J3, U1, Y1	\$7.90 J3, U1, Y1	6.65 U1, Y1
WEST	Granite City, Ill.	4.525 G2	5.525 G2	6.05 G2	6.10 G2							\$8.00 G2	6.75 G2
	Kokomo, Ind.			5.95 C9						5.125 C9			
	Mansfield, Ohio	4.325 E2	5.325 E2			6.25 E2				E2			
	Middletown, Ohio		5.325 A7	5.85 A7	5.90 A7	6.25 A7							
	Niles, Warren, Ohio Sharon, Pa.	4.325 S1, R3, N3	5.325 R3, N3	5.85 R3 6.85 N3	5.90 N3	6.25 N3	6.375 S1, R3	7.875 R3			\$9.20 R3	\$7.90 R3	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 J3, U1, P6	5.325 J3, U1, P6	5.85 U1	5.90 U1, A7		6.375 J3, U1	7.875 U1	8.60 U1	5.025 A5, P6	\$9.20 J3, U1	\$7.90 J3, U1	6.65 U1
	Portsmouth, Ohio	4.325 P7	5.325 P7							5.025 P7			
	Weirton, Wheeling, Follansbee, W. Va.	4.325 W3, W5	5.325 W3, W5, F3	5.85 W3, W5		6.25 W3, W5	6.375 W3	7.875 W3			\$9.20 W3, W5	\$7.90 W3, W5	6.65 F3, W5
	Youngstown, Ohio	4.325 U1, Y1	5.325 Y1		5.90 Y1		6.375 U1, Y1	7.875 Y1		5.025 Y1			
	Fontana, Cal.	5.975 K1	6.425 K1			7.125 K1	8.975 K1						
	Geneva, Utah	4.425 C7											
SOUTH	Kansas City, Mo.									5.275 S2			
	Los Angeles, Torrance, Cal.									5.825 B2			
	Minneapolis, Colo.									5.275 C6			
	San Francisco, Niles, Pittsburg, Cal.	5.025 C7	6.275 C7	6.60 C7						5.675 C7	\$9.95 C7	\$8.65 C7	
	Seattle, Wash.												
	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	4.325 R3, T2	5.325 T2	5.85 R3, T2		6.375 T2				5.625 R3	5.025 R3, T2	\$9.30 T2	\$8.00 T2
	Houston, Tex.									5.275 S2			

IRON AGE		<i>Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.</i>										
STEEL PRICES		BARS					PLATES				WIRE	
<i>(Effective Jan. 10, 1956)</i>		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Flange Plate	Alloy	Hi Str. Low Alloy	Mir's. Bright
EAST	Bothlehen, Pa.				5.575 B3	7.425 B3	6.80 B3					
	Buffalo, N. Y.	4.65 B3,R3	4.65 B3,R3	5.95 B5	5.575 B3,R3	7.425 B3,B5	6.80 B3	4.50 B3,R3		6.30 C4	6.725 C4	6.60 W6
	Claymont, Del.							4.80 C4		6.30 L4	6.725 L4	
	Coatesville, Pa.							4.80 L4				
	Conahohocken, Pa.							4.50 A2	5.575 A2		6.725 A2	
	Harrisburg, Pa.							5.10 P2	5.575 C3			
	Hartford, Conn.			6.40 R3		7.725 R3						
	Johnstown, Pa.	4.65 B3	4.65 B3		5.575 B3		6.80 B3	4.50 B3		6.30 B3	6.725 B3	6.25 B3
	Fairless, Pa.	4.80 U1	4.80 U1		5.725 U1							
	Newark, N. J.			6.35 W10		7.60 W10						
	Camden, N. J.			6.35 P10								
	Bridgeport, Putnam, Conn.	4.80 N8		6.45 W10	5.725 N8			4.750 N8				
	Sparrows Pt., Md.		4.65 B3					4.50 B3		6.30 B3	6.725 B3	6.35 B3
MIDDLE WEST	Palmer, Worcester, Readville, Mass.			6.35 W11 6.45 B5,C14		7.725 A5,B5		4.50 R3				6.55 A5, 6.90 W6
	Spring City, Pa.			6.35 K4		7.60 K4						
	Alton, Ill.	4.85 L1										6.425 L1
	Ashland, Newport, Ky.							4.50 A7,N3		6.30 N5		
	Canton-Masillon, Mansfield, Ohio	4.75 R3		5.90 R2,R3	5.575 R3,T5	7.425 R2,R3,T5		4.50 B3				
	Chicago, Joliet, Ill.	4.65 U1, N4,W8,R3, P13	4.65 N4,R3, P13	5.90 A5,W10, W8,B5,L2	5.575 U1,R3, W8	7.425 A5,W8, W10,L2,B5		4.50 U1,W8, I3,A1,R3	5.575 U1	6.30 U1	6.725 U1	6.25 A5,R3, N4,W7
	Cleveland, Ohio	4.65 R3	4.65 R3	5.90 A5,C13		7.425 A5,C13	6.80 R3	4.50 J3,R3	5.575 J3		6.725 R3,J3	6.25 A5, C13
	Detroit, Mich.	4.75 G3	4.75 G3	5.90 R5 6.10 B5,P8 6.15 P3	5.575 R5 5.675 G3	7.425 R5 7.625 B5,P3 P8	6.90 G3	4.60 G3			6.825 G3	
	Duluth, Minn.											6.25 A5
	Gary, Ind. Harbor, Crawfordville	4.65 I3,U1, Y1	4.65 I3,U1, Y1	5.90 M5,R3	5.575 I3,U1, Y1	7.425 M5, R3	6.80 U1,I3, Y1	4.50 I3, U1,Y1	5.575 I3	6.30 U1,Y1	6.725 U1, I3,Y1	6.35 M4
	Granite City, Ill.							4.70 G3				
	Kokomo, Ind.											6.35 C9
	Sterling, Ill.	4.75 N4	4.75 N4									6.35 N4
WEST	Niles, Warren, Ohio Sharon, Pa.	4.65 R3,C10		5.90 C10	5.575 C10	7.425 C10	6.80 R3	4.50 S1,R3		6.30 S1	6.725 S1	
	Pittsburgh, Pa. Midland, Pa.	4.65 J3,U1, C11	4.65 J3,U1	5.90 A5,C8, C11,J3, W10,B4,R3	5.575 U1,C11	7.425 A5,C11, W10,C8,R3	6.80 J3,U1	4.50 J3,U1	5.575 U1	6.30 U1	6.725 J3,U1	6.25 A5,J3, P6
	Portsmouth, Ohio											6.25 P7
	Weirton, Wheeling, Follansbee, W. Va.	4.65 W3						4.50 W3,W3				
	Youngstown, Ohio	4.65 U1,Y1, C10,R3	4.65 U1,Y1, R3	5.90 Y1,U1	5.575 U1,Y1, C10	7.425 Y1,C10 F2	6.80 U1,Y1	4.50 U1,Y1, R3		6.30 Y1	6.725 Y1	6.25 Y1
	Emeryville, Cal.	5.40 J5	5.40 J5									
	Fontana, Cal.	5.35 K1	5.35 K1		6.625 K1		7.50 K1	5.15 K1		6.95 K1	7.375 K1	
	Geneva, Utah							4.50 C7			6.725 C7	
	Kansas City, Mo.	4.90 S2	4.90 S2		5.825 S2		7.05 S2					6.50 S2
	Los Angeles, Torrance, Cal.	5.35 B2,C7	5.35 B2,C7	7.35 R3	6.625 B2		7.50 B2				7.625 B2	7.20 B2
	Minnequa, Colo.	5.10 C6	5.10 C6					5.35 C6				6.50 C6
	Portland, Ore.	5.40 O2	5.40 O2									
	San Francisco, Niles, Pittsburg, Cal.	5.35 C7 5.40 B2,P9	5.35 C7 5.40 B2,P9				7.55 B2					7.20 C7
	Seattle, Wash.	5.40 B2,P12, N6	5.40 B2,P12				7.55 B2	5.40 B2		7.30 B3	7.625 B2	
SOUTH	Atlanta, Ga.	4.85 A8	4.85 A8									6.45 A8
	Fairfield, Ala. City, Birmingham, Ala.	4.65 T2,R3 5.15 C16	4.65 T2,R3 5.15 C16				6.80 T2	4.50 T2,R3			6.725 T2	6.25 R3, T2
	Houston, Ft. Worth, Lone Star, Tex.	4.90 S2	4.90 S2		5.825 S2		7.05 S2	4.85 L3 4.60 S2		6.40 S2	6.825 S2	6.50 S2

Steel Prices (Effective Jan. 10, 1956)

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
 A2 Alan Wood Steel Co., Cambridge, Pa.
 A3 Allegheny Ludlum Steel Corp., Pittsburgh
 A4 American Cladmetal Co., Carnegie, Pa.
 A5 American Steel & Wire Div., Cleveland
 A6 Angell Nail & Chaplet Co., Cleveland
 A7 Armco Steel Corp., Middletown, O.
 A8 Atlantic Steel Co., Atlanta, Ga.
 B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
 B2 Bethlehem Pacific Coast Steel Corp., San Francisco
 B3 Bethlehem Steel Co., Bethlehem, Pa.
 B4 Blair Strip Steel Co., New Castle, Pa.
 B5 Bliss & Laughlin, Inc., Harvey, Ill.
 B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
 C1 Calstrip Steel Corp., Los Angeles
 C2 Carpenter Steel Co., Reading, Pa.
 C3 Central Iron & Steel Co., Harrisburg, Pa.
 C4 Claymont Products Dept., Claymont, Del.
 C5 Cold Metal Products Co., Youngstown, O.
 C6 Colorado Fuel & Iron Corp., Denver
 C7 Columbia Geneva Steel Div., San Francisco
 C8 Columbia Steel & Shifting Co., Pittsburgh
 C9 Continental Steel Corp., Kokomo, Ind.
 C10 Copperweld Steel Co., Pittsburgh, Pa.
 C11 Crucible Steel Co. of America, Pittsburgh
 C12 Cumberland Steel Co., Cumberland, Md.
 C13 Cuyahoga Steel & Wire Co., Cleveland
 C14 Compressed Steel Shifting Co., Readville, Mass.
 C15 G. O. Carlson, Inc., Inverdale, Pa.
 C16 Connors Steel Div., Birmingham
 C17 Chester Blast Furnace Inc., Chester, Pa.
 D1 Detroit Steel Corp., Detroit
 D2 Detroit Tube & Steel Div., Detroit
 D3 Driver Harris Co., Harrison, N. J.
 D4 Dickson Weatherproof Nail Co., Evanston, Ill.
 D5 Henry Dison & Sons, Inc., Philadelphia
 E1 Eastern Stainless Steel Corp., Baltimore
 E2 Empire Steel Co., Mansfield, O.
 F1 Fifth Sterling, Inc., McKeesport, Pa.
 F2 Fitzsimmons Steel Corp., Youngstown
 F3 Follansbee Steel Corp., Follansbee, W. Va.
 G1 Globe Iron Co., Jackson, O.

G2 Granite City Steel Co., Granite City, Ill.
 G3 Great Lakes Steel Corp., Detroit
 G4 Greer Steel Co., Dover, O.
 H1 Hanna Furnace Corp., Detroit
 I1 Ingersoll Steel Div., Chicago
 I2 Inland Steel Co., Chicago
 I3 Interlake Iron Corp., Cleveland
 J1 Jackson Iron & Steel Co., Jackson, O.
 J2 Joseph Steel Corp., Washington, Pa.
 J3 Jones & Laughlin Steel Corp., Pittsburgh
 J4 Joslyn Mfg. & Supply Co., Chicago
 J5 Judson Steel Corp., Emeryville, Calif.
 K1 Kaiser Steel Corp., Fontana, Cal.
 K2 Keystone Steel & Wire Co., Peoria
 K3 Koppers Co., Granite City, Ill.
 K4 Keystone Drawn Steel Co., Spring City, Pa.
 L1 Laclede Steel Co., St. Louis
 L2 La Salle Steel Co., Chicago
 L3 Lane Star Steel Co., Dallas
 L4 Lukens Steel Co., Coatesville, Pa.
 M1 Mahoning Valley Steel Co., Niles, O.
 M2 McLouth Steel Corp., Detroit
 M3 Mercer Tube & Mfg. Co., Sharon, Pa.
 M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
 M5 Monarch Steel Div., Hammond, Ind.
 M6 Mystic Iron Works, Everett, Mass.
 N1 National Supply Co., Pittsburgh
 N2 National Tube Div., Pittsburgh
 N3 Niles Rolling Mill Div., Niles, O.
 N4 Northwestern Steel & Wire Co., Sterling, Ill.
 N5 Newport Steel Corp., Newport, Ky.
 N6 Northwest Steel Rolling Mills, Seattle
 N7 Newman Crosby Steel Co., Pawtucket, R. I.
 N8 Northeastern Steel Corp., Bridgeport, Conn.
 O1 Oliver Iron & Steel Co., Pittsburgh
 O2 Oregon Steel Mills, Portland
 P1 Page Steel & Wire Div., Monessen, Pa.
 P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
 P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
 P4 Pittsburgh Coke & Chemical Co., Pittsburgh
 P5 Pittsburgh Screw & Bolt Co., Pittsburgh
 P6 Pittsburgh Steel Co., Pittsburgh
 P7 Portsmouth Div., Detroit Steel Corp., Detroit
 P8 Plymouth Steel Co., Detroit

P9 Pacific States Steel Co., Niles, Cal.
 P10 Precision Drawn Steel Co., Camden, N. J.
 P11 Production Steel Strip Corp., Detroit
 P12 Pacific Steel Rolling Mills, Seattle
 P13 Phoenix Mfg. Co., Joliet, Ill.
 R1 Reeves Steel & Mfg. Co., Dover, O.
 R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
 R3 Republic Steel Corp., Cleveland
 R4 Roebbing Sons Co., John A., Trenton, N. J.
 R5 Rotary Electric Steel Co., Detroit
 R6 Rodney Metals, Inc., New Bedford, Mass.
 R7 Rome Strip Steel Co., Rome, N. Y.
 S1 Sharon Steel Corp., Sharon, Pa.
 S2 Sheffield Steel Corp., Kansas City
 S3 Shenango Furnace Co., Pittsburgh
 S4 Simonds Saw & Steel Co., Fitchburg, Mass.
 S5 Sweet's Steel Co., Williamsport, Pa.
 S6 Standard Forging Corp., Chicago
 S7 Stanley Works, New Britain, Conn.
 S8 Superior Drawn Steel Co., Monaca, Pa.
 S9 Superior Steel Corp., Carnegie, Pa.
 S10 Seneca Steel Service, Buffalo
 T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
 T2 Tennessee Coal & Iron Div., Fairfield
 T3 Tennessee Products & Chem. Corp., Nashville
 T4 Thomas Strip Div., Warren, O.
 T5 Timken Steel & Tube Div., Canton, O.
 T6 Tremont Nail Co., Waltham, Mass.
 T7 Texas Steel Co., Fort Worth
 T8 Thompson Wire Co., Boston
 U1 United States Steel Corp., Pittsburgh
 U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
 U3 Ulbrich Stainless Steels, Wallingford, Conn.
 U4 U. S. Pipe & Foundry Co., Birmingham
 W1 Wallingford Steel Co., Wallingford, Conn.
 W2 Washington Steel Corp., Washington, Pa.
 W3 Weirton Steel Co., Weirton, W. Va.
 W4 Wheatland Tube Co., Wheatland, Pa.
 W5 Wheeling Steel Corp., Wheeling, W. Va.
 W6 Wickwire Spencer Steel Div., Buffalo
 W7 Wilson Steel & Wire Co., Chicago
 W8 Wisconsin Steel Co., S. Chicago, Ill.
 W9 Woodward Iron Co., Woodward, Ala.
 W10 Wycoff Steel Co., Pittsburgh
 W11 Worcester Pressed Steel Co., Worcester, Mass.
 W12 Wallace Barnes Steel Div., Bristol, Conn.
 Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (per) f.a.b. mills. Base price about \$200 per net ton

	BUTTWELD														SEAMLESS							
	1/2 in.		3/4 in.		1 in.		1 1/4 in.		1 1/2 in.		2 in.		2 1/2 in.		3 in.		3 1/2 in.					
	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.
STANDARD T. & C.																						
Sparrows Pt. B3.....	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Youngstown R3.....	18.50	1.25	21.50	5.25	24.00	16.75	26.50	10.00	27.00	11.00	27.50	11.50	29.00	11.75								
Fentona K1.....	7.00	+10.25	10.00	+6.25	12.50	+2.75	15.00	+1.50	15.50	+1.50	16.00	0.00	17.50	0.25								
Pittsburgh J3.....	18.50	1.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Alton, Ill. L1.....	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Sharon M3.....	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Fairless N2.....	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Pittsburgh N1.....	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Wheeling W5.....	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Wheatland W4.....	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Youngstown Y1.....	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Indiana Harbor Y1.....	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.00	26.00	11.50	26.50	12.00	28.00	11.75								
Lorain N2.....	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
EXTRA STRONG																						
PLAIN ENDS																						
Sparrows Pt. B3.....	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Youngstown R3.....	23.00	7.25	27.00	11.25	29.00	14.75	29.50	14.00	30.00	15.00	30.50	15.50	31.00	14.75								
Fairless N2.....	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Fentona K1.....	11.50		15.50		17.50		18.00		18.50		19.00		19.50									
Pittsburgh J3.....	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Alton, Ill. L1.....	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Sharon M3.....	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Pittsburgh N1.....	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Wheeling W5.....	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Wheatland W4.....	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Youngstown Y1.....	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Indiana Harbor Y1.....	22.00	8.25	26.00	12.25	28.00	15.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75								
Lorain N2.....	21.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75

Threads only, butt-weld and seamless 2 1/2 pt. higher discount. Plain ends, butt-weld and seamless, 3-in. and under, 5 1/4 pt. higher discount. Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb., East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2 in., 1 1/2 pt.; 2 1/2 and 3-in., 1 pt. o.g., zinc price range of over 11¢ to 13¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

(Effective Jan. 10, 1956)

To identify producers, see Key on preceding page.

TOOL STEEL

F.o.b. mill					
W	Cr	V	Mo	Co	per lb
18	4	1	—	—	\$1.60
18	4	1	—	5	2.305
18	4	2	—	—	1.765
1.5	4	1.5	8	—	.96
6	4	2	6	—	1.35
6	4	3	5	—	1.105
High-carbon chromium					
Oil hardened manganese					
Special carbon					
Extra carbon					
Regular carbon					
Warehouse prices on and east of Mis-					
sissippi are 4¢ per lb higher. West of					
Mississippi, 6¢ higher.					

CLAD STEEL

Base prices, cents per lb f.o.b.

Cladding	Plate (A3, J2, L4)			Sheet (J2)
	10 pct	15 pct	20 pct	
304	30.30	33.15	36.05	32.50
316	35.50	38.45	41.40	47.00
321	32.00	34.85	37.75	37.25
347	34.40	37.90	41.40	48.25
405	25.80	29.60	33.35	—
410, 430	25.30	29.10	32.85	—

CR Strip (S9) Copper, 10 pct, 2 sides, 38.00; 1 side, 30.00.

WARE-HOUSES

Base price, f.o.b., dollars per 100 lb.

Cities	City Delivery Charge	Sheets			Strip		Plates Shapes		Bars		Alloy Bars			
		Hot-Rolled	Cold-Rolled	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled	Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed	
Baltimore	\$10	7.03	8.32	8.37	7.65	—	7.21	7.93	7.61	8.62	13.44	16.36	16.29	16.49
Birmingham	.15	6.80	7.93	8.85	7.06	—	6.99	7.28	7.08	9.35	13.96	—	—	—
Boston	.10	7.70	8.81	10.27	7.94	10.30	7.89	8.13	7.83	9.53	12.15	13.40	16.65	16.50
Buffalo	.30	7.15	7.90	9.70	7.45	—	7.45	7.70	7.45	7.90	13.10	—	—	16.15
Chicago	.25	7.15	8.39	8.80	7.36	—	7.29	7.58	7.42	7.75	13.20	12.85	16.05	15.90
Cincinnati	.25	7.27	8.38	9.20	7.60	—	7.58	8.05	7.66	8.05	13.44	13.09	16.29	16.14
Cleveland	.30	7.15	8.39	9.10	7.46	—	7.46	7.91	7.48	7.85	—	12.91	—	15.96
Denver	—	8.60	10.76	11.22	8.90	—	8.60	8.75	8.90	9.82	—	—	17.97	—
Detroit	.25	6.99	8.28	8.78	7.34	8.15	7.27	7.75	7.36	8.04	13.40	13.05	16.25	16.10
Houston	—	7.85	8.75	10.49	8.15	—	7.80	8.20	8.25	9.85	14.35	14.00	17.15	17.05
Kansas City	.20	7.47	8.76	9.17	7.73	—	7.66	7.95	7.75	8.52	13.87	13.52	16.72	16.57
Los Angeles	.10	8.05	10.00	11.00	8.35	—	8.05	8.30	8.05	10.70	—	14.25	—	17.85
Memphis	.10	7.12	8.25	—	7.38	—	7.31	7.60	7.40	9.15	—	—	—	—
Milwaukee	.25	7.24	8.48	8.89	7.45	—	7.38	7.75	7.51	7.94	—	12.94	—	15.99
New Orleans	.15	7.20	8.35	—	7.45	—	7.40	7.70	7.50	9.55	—	—	—	—
New York	.10	7.46	8.68	9.44	8.07	11.10	7.76	7.99	7.96	9.48	13.63	13.28	16.48	16.33
Norfolk	.20	7.25	—	—	7.65	—	7.45	7.95	7.65	9.50	—	—	—	—
Philadelphia	.10	7.14	8.42	9.35	7.67	—	7.37	7.74	7.64	8.46	13.36	13.16	16.36	16.21
Pittsburgh	.25	6.80	8.09	9.20	7.16	9.00	6.99	7.28	7.08	7.85	13.20	12.85	16.05	15.90
Portland	—	7.80	8.80	10.65	8.00	7.95	7.75	7.85	7.95	12.20	—	15.00	—	17.50
Salt Lake City	.20	—	10.60	—	9.35	—	—	9.20	9.15	—	—	—	—	—
San Francisco	.10	8.10	9.65	10.15	8.35	—	8.05	8.25	8.05	11.20*	—	14.25	—	17.85
Seattle	.00	8.55	10.40	10.80	8.65	—	8.20	8.30	8.35	11.70	—	14.60	—	17.65
St. Louis	.25	7.44	8.68	9.49	7.65	—	7.58	7.98	7.71	8.14	13.69	13.14	16.35	16.19
St. Paul	.25	7.46	8.59	9.16	7.72	—	7.65	7.94	7.74	8.51	—	13.51	—	16.31

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions: (1) 1500 to 9999 lb. (2) 1000 lb or over. (3) \$.25 delivery. (4) 1000 to 1999 lb, \$.25 delivery.

* Plus analysis charge.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
		Semi-Processed	Fully Processed
Field	8.40	8.60	—
Armature	9.35	9.60	10.10
Elect.	9.95	10.20	10.70
Motor	10.95	11.20	11.70
Dynamo	11.85	12.10	12.60
Trans. 72	12.80	13.05	13.55
Trans. 65	13.35	Grain Oriented	
Trans. 58	13.85	Trans. 80	17.45
Trans. 52	14.85	Trans. 73	17.95

Producing points: Beech Bottom (W3); Brackenridge (A3); Granite City (G2); Indiana Harbor (I3); Mansfield (E2); Newport, Ky. (N5); Niles, O. (N3); Vandergrift (U1); Warren, O. (R3); Zanesville (A7).

* Coils 75¢ higher.

LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. Prices effective for 1955 season.

Gross Ton

Openhearth lump	\$12.10
Old range, bessemer	11.25
Old range, nonbessemer	11.10
Mesabi, bessemer	11.10
Mesabi, nonbessemer	10.85
High phosphorus	10.85

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails		Woven Wire Fence 9-15 1/2 ga.		Fence Posts		Single Loop Bale Ties		Galv. Barbed and Twisted Barbless Wire		Merch. Wire Ann'd		Merch. Wire Galv.	
	Cal	Cal	Cal	Cal	Cal	Cal	e lb.	e lb.	e lb.	e lb.	e lb.	e lb.	e lb.	e lb.
Alabama City R3	152	162	—	173	175	7.40	7.80	—	—	—	—	—	—	—
Aliquippa, Pa. J3	152	162	—	173	175	7.40	7.80	—	—	—	—	—	—	—
Atlanta A8	154	167	—	175	180	7.50	8.025	—	—	—	—	—	—	—
Bartonsville K2*	154	168	—	175	181	7.50	8.075	—	—	—	—	—	—	—
Buffalo W6	—	—	—	—	—	—	7.40	7.80	—	—	—	—	—	—
Chicago, Ill. N4**	152	166	—	173	179	7.40	8.00	—	—	—	—	—	—	—
Cleveland A6	157	—	—	—	—	—	7.40	—	—	—	—	—	—	—
Cleveland A5	—	—	—	—	—	—	7.40	—	—	—	—	—	—	—
Crawfordsville M4*	154	167	—	175	175	7.50	8.05	—	—	—	—	—	—	—
Donora, Pa. A5	152	162	—	173	175	7.40	7.80	—	—	—	—	—	—	—
Duluth A5	152	162	—	173	175	7.40	7.80	—	—	—	—	—	—	—
Fairfield, Ala. T2	152	162	—	173	175	7.40	7.80	—	—	—	—	—	—	—
Galveston D4	157	—	—	—	—	—	7.40	—	—	—	—	—	—	—
Houston S2	167	170	—	189	7.65	8.05	—	—	—	—	—	—	—	—
Johannston, Pa. B3*	152	166	—	175	7.40	7.80	—	—	—	—	—	—	—	—
Joliet, Ill. A5	152	162	—	173	175	7.40	7.80	—	—	—	—	—	—	—
Kokomo, Ind. C9	154	154	—	175	177	7.50	7.90	—	—	—	—	—	—	—
Los Angeles B2*	—	—	—	—	—	—	8.35	8.05	—	—	—	—	—	—
Kansas City S2	167	174	—	178	180	7.65	8.05	—	—	—	—	—	—	—
Minnequa C6	157	167	162	178	180	7.65	8.05	—	—	—	—	—	—	—
Monessen P6	152	162	—	—	—	—	7.40	7.80	—	—	—	—	—	—
Moline, Ill. R3	162	162	—	—	—	—	—	—	—	—	—	—	—	—
Pittsburg, Cal. C7	171	185	—	—	195	8.35	8.75	—	—	—	—	—	—	—
Portsmouth P7	—	—	—	—	—	—	7.40	—	—	—	—	—	—	—
Rankin, Pa. A5	152	162	—	173	175	7.40	7.80	—	—	—	—	—	—	—
So. Chicago R3	152	162	157	173	175	7.40	7.80	—	—	—	—	—	—	—
S. San Francisco C6	—	—	—	—	197	195	8.35	8.75	—	—	—	—	—	—
Sparrows Pt. B3*	154	—	—	175	181	7.50	8.075	—	—	—	—	—	—	—
Struthers, O. Y1	—	—	—	—	—	—	7.40	7.90	—	—	—	—	—	—
Worcester A5	158	—	—	—	—	—	7.70	—	—	—	—	—	—	—
Williamsport, Pa. S5	—	160	—	—	—	—	—	—	—	—	—	—	—	—

Galvanized products computed with zinc at 5¢ per lb. Exceptions: *zinc at 12.5¢ per lb. **13¢ zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT				
	0.26	0.41	0.61	0.81	1.06
	0.40	0.60	0.80	1.05	1.35
Bristol, Conn. W12	—	—	10.80	12.95	15.65
Buffalo, N. Y. R7	7.00	8.95	10.50	12.65	15.35
Carnegie, Pa. S9	—	—	9.05	10.60	12.75
Cleveland A5	7.10	9.05	10.60	12.75	15.45
Detroit D1	7.20	9.15	10.70	12.85	—
Detroit D2	7.29	9.15	10.70	—	—
Harrison, N. J. C11	—	—	10.80	12.95	15.65
Indianapolis C5	7.15	9.10	10.50	12.65	15.35
New Castle, Pa. B4	7.00	8.95	10.50	12.65	—
New Haven, Conn. D1	7.55	9.35	10.90	13.05	—
Pawtucket, R. I. N7	7.55	9.25	10.80	12.95	15.65
Pittsburgh S7	7.10	9.05	10.60	12.75	15.45
Riversdale, Ill. A1	7.20	9.05	10.60	12.75	15.45
Sharon, Pa. S1	7.10	9.05	10.60	12.75	15.45
Trenton R4	—	—	—	—	—
Wallingford W1	7.45	9.25	10.80	12.95	15.65
Warren, Ohio T4	7.00	8.95	10.50	12.65	15.35
Weirton, W. Va. W3	7.10	8.95	10.50	—	—
Worcester, Mass. A5	7.65	9.35	10.90	13.05	15.75
Youngstown C5	7.00	8.95	10.50	12.65	15.35

BOILER TUBES

Size \$ per 100 ft. carload cuts, lot 10 to 24 ft. F.o.b. Mill	Seam
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RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb.	No. 1 Sd. Kills	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Beasmer U1	4.725	5.65	5.825				
So. Chicago R3				7.90			
Enaley T2	4.725	5.65					
Fairfield T2		5.65		7.90	5.625		
Gary U1	4.725	5.65			5.625		
Ind. Harbor Y1	4.725		5.825	7.90	5.525		
Johnstown B3		5.65		7.90			
Joliet U1		5.65	5.825				
Kansas City S2				7.90			
Lackawanna B3	4.725	5.65	5.825		5.625		
Minnequa C6	4.725	6.15	5.825	7.90	5.625	12.40	
Pittsburgh G1					11.90	12.40	
Pittsburgh P5						12.40	
Pittsburgh J3				7.90			
Seattle B2				8.40	5.775	12.90	
Steelton B3	4.725		5.825		5.625		
Struthers Y1				7.90			
Torrance C7					5.775		
Williamsport S5		5.65					
Youngstown R3				7.90			

COKE

Furnace, beehive (f.o.b. oven)	Net-Ton
Connellsville, Pa.	\$14.00 to \$14.50
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	\$16.00 to \$16.50
Foundry, oven coke	
Buffalo, del'd	\$28.08
Chicago, f.o.b.	25.75
Detroit, f.o.b.	26.25
New England, del'd	28.55
Seaboard, N. J., f.o.b.	25.50
Philadelphia, f.o.b.	25.00
Swedeland, Pa., f.o.b.	25.00
Plainsville, Ohio, f.o.b.	25.50
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, f.o.b.	24.40
Lone Star, Tex., f.o.b.	19.50

ELECTRODES

Cents per lb., f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	23.00	40	100, 110	9.90
20	72	22.25	35	110	9.90
16 to 18	72	22.50	30	110	10.05
14	72	23.00	24	72 to 84	10.30
12	72	23.50	20	90	10.10
10	60	24.25	17	72	10.35
7	60	24.50	14	72	10.85
6	60	27.25	12	60	11.75
4	40	30.25	10	60	11.80
3	40	32.00	8	60	12.10
2 1/2	30	33.75			
2	24	52.50			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes	
(Cents per lb., f.o.b. shipping point)	
Copper	
Cast elliptical, 18 in. or longer,	
5000 lb lots	58.92
Electrodeposited	55.25
Brass, 80-20, ball anodes, 2000 lb	58.00
or more	
Zinc, ball anodes, 2000 lb lots	20.75
(for elliptical add 2¢ per lb.)	
Nickel, 99 pct plus, rolled carbon,	90.50
(rolled depolarized add 3¢ per lb.)	
Cadmium	\$1.70
Tin, ball anodes and elliptical	\$1.06 to \$1.10
Chemicals	
(Cents per lb., f.o.b. shipping point)	
Copper cyanide, 100 lb drum	83.50
Copper sulphate, 5 or more 100 lb	
bags, per cwt	18.15
Nickel salts, single, 4-100 lb bags,	33.25
Nickel chloride, freight allowed,	
300 lbs	43.50
Sodium cyanide, domestic, fob N. Y.	
1 to 4 200 lb drums	21.55
(Philadelphia add .50 per lb.)	
Zinc cyanide, 100 to 900 lb	55.55
Potassium cyanide, 100 lb drum	
N. Y.	48.00
Chromic acid, flake type, 1 to 20	
100 lb drums	31.20

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolt

	Discounts	
	Full case 20,000 lb.	Quantity or more
1/2 in. & smaller x 6 in. & shorter	61	63
Larger than 1/2 in. diam. and all diam. longer than 6 in.	55	57
Rolled thread carriage bolts		
1/2 in. & smaller x 6 in. and shorter	61	63
Lag, all diam. x 6 in. & shorter	61	63
Lag, all diam. longer than 6 in.	55	57
Flow bolts	61	63

Nuts, Hex., H.P., reg. & hvy.

3/4" or smaller	64	66
7/8" to 1 1/4" inclusive	63	65
1 1/2" to 1 3/4" inclusive	65	67
1 3/4" and larger	61	63

C.P. Hex regular & hvy

3/4" or smaller	64	66
7/8" and larger	61	63

Hot Galv. Nuts (all types)

1 1/2" or smaller	44	47
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Finished, Semi-finished, Hex. Nuts

3/4" and smaller	66	66
7/8" and larger	63	63
Add 25% for less than case or keg quantity.		

Rivets

	Base per 100 lb	
	Pct Off List	
1/2 in. and larger	\$9.95	
7/16 in. and smaller	32	

Cap Screws

	Discount	
	H.C.	Heat
Bright Treated		
New std. hex head, pack-aged		
1/4" thru 1/2" diam. x 6"	34	20
and shorter		
9/16 and 5/8" x 6" and smaller and shorter	31	16
3/8", 1/2", 1" x 6" and shorter	9	+11
New std. hex head, bulk*		
1/4" thru 1/2" diam. x 6"		
and shorter	49	41
9/16" and 5/8" diam. x 6"		
and shorter	43	39
3/8", 1/2", 1" x 6" and shorter	31	20
*Minimum quantity per item:		
15,000 pieces 1/4", 5/16", 3/8" diam.		
5,000 pieces 7/16", 1/2", 9/16", 5/8" diam.		
2,000 pieces 3/4", 7/8", 1" diam.		

Machine Screws & Stove Bolts

	Discount	
	Mach. Screws	Stove Bolts
Packaged, package list	27	38
Bulk, bulk list		
Quantity		
1/4-in. diam. & under	25,000-200,000	20 61
5/16-in. diam. & larger	15,000-100,000	20 61
All diam. over 3 in. long	5,000-100,000	— 61

Machine Screw & Stove Bolt Nuts

	Discount	
	Hex	Square
Packaged, package list	24	27
Bulk, bulk list		
Quantity		
3/4-in. diam. & smaller	25,000-200,000	18 20

CAST IRON WATER PIPE INDEX

Birmingham	109.3
New York	121.5
Chicago	122.9
San Francisco-L.A.	131.1
Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.	

REFRACTORIES

Fire Clay Brick	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa., (except Salina, Pa., add \$5.00)	\$122.00
No. 1 Ohio	
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$1.50)	18.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$128.00
Childs, Hays, Pa.	138.00
Chicago District	138.00
Western Utah	144.00
California	151.00
Super Duty	
Hays, Pa., Athens, Tex., Windham, Warren, O.	145.00
Curtner, Calif.	163.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	21.00
Silica cement, net ton, bulk, Hays, Pa.	24.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	22.00
Silica cement, net ton, bulk, Utah and Calif.	32.00

Chrome Brick

Standard chemically bonded, Balt.	\$91.00
Standards chemically bonded, Curtner, Calif.	101.25
Burned, Balt.	85.00

Magnesite Brick

Standard Baltimore	\$114.00
Chemically bonded, Baltimore	102.00

Grain Magnesite

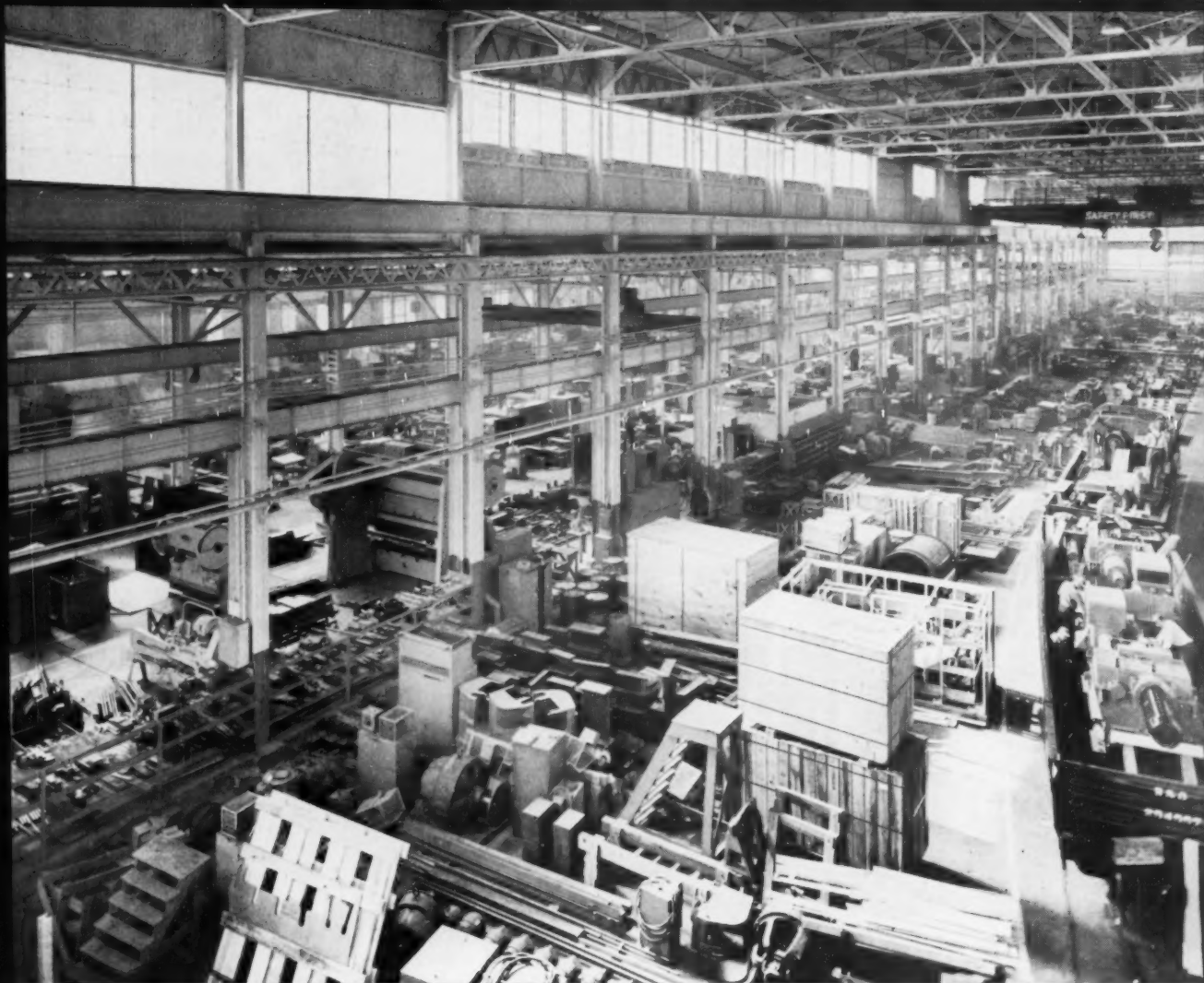
St. 3/4-in. grains	
Domestic, f.o.b. Baltimore	
In bulk fines removed	\$64.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
In bulk	40.00
In sacks	46.00

Dead Burned Dolomite

Per net ton	
F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	\$15.00
Midwest	15.60
Missouri Valley	14.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.	
Swedish sponge iron c.i.f.	
New York, ocean bags	9.50¢
Canadian sponge iron,	
Del'd in East, carloads	9.5¢
Domestic sponge, iron, 98+%	
Fe, carload lots	9.5¢
Electrolytic iron, annealed,	
imported 99.5+%	27.5¢
domestic 99.5+%	36.5¢
Electrolytic iron, unannealed	
minus 325 mesh, 99+%	57.0¢
Electrolytic iron melting stock, 99.84% pure	22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 00.8+%	86.0¢ to \$1.55
Aluminum freight allowed	34.50¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	61.50¢
Copper, reduced	61.50¢
Cadmium, 100-199 lb. 95¢ plus metal value	
Chromium, electrolytic, 99% min., and quality, del'd.	\$3.60
Lead	7.50¢ plus metal value
Manganese	70.0¢
Molybdenum, 99%	\$3.00 to \$3.25
Nickel, unannealed	\$1.00
Nickel, annealed	\$1.06
Nickel, spherical, unannealed	\$1.18
Silicon	43.50¢
Solder powder, 7.0¢ to 9.0¢ plus met. value	
Stainless steel, 302	99.0¢
Stainless steel, 316	11.32
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	\$4.30
Zinc, 10 ton lots	18.75¢ to 32.50¢



ANOTHER *expansion* FOR AETNA-STANDARD

● Aetna-Standard's fourth major expansion in 15 years expands production capacity by 40%.

The expansion increases machining, welding and assembly facilities with more floor space and new machine tools. A new power plant moves the KVA load from 300 to 750 KVA capacity.

The continued demand for steel, copper, brass, aluminum, rubber and plastic requires more and more production machinery, such as Aetna-Standard designs and manufactures. Capacity to produce more equipment is a responsibility of the machinery manufacturer who depends upon these basic industries for his orders.

AETNA • STANDARD

THE AETNA-STANDARD ENGINEERING COMPANY

GENERAL OFFICES: PITTSBURGH, PA.

PLANTS: ELLWOOD CITY, PA., WARREN, OHIO

CONTINUOUS GALVANIZING LINES ● CONTINUOUS ELECTROLYTIC TINNING LINES ● SIDE TRIMMING AND SHEAR LINES AND OTHER FINISHING EQUIPMENT ● CONTINUOUS BUTT WELD PIPE MILLS ● SEAMLESS TUBE MILLS ● DRAWBENCHES AND OTHER COLD DRAW EQUIPMENT ● ROLLS AND CASTINGS ● EXTRUDERS, MILLS, PRESSES FOR RUBBER AND PLASTIC

Ferroalloy Prices

(Effective Jan. 10, 1956)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk carloads, del'd, 67-71% Cr, 30-100% max. Si.

0.02% C	38.50	0.20% C	35.50
0.05% C	36.50	0.50% C	35.25
0.10% C	36.00	1.00% C	34.00
0.15% C	35.75	2.00% C	33.75
4.00-4.50% C, 67.70% Cr, 1-2% Si	26.25		
3.50-5.00% C, 57-64% Cr, 2.00-4.00% Si	25.00		

S. M. Ferrochrome

Contract prices, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	28.65
Ton lots	30.55
Less ton lots	32.05

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 3¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	\$1.27
0.50% max. C	1.27
9 to 11% C, 88-91% Cr, 0.75% Fe	1.36

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.

Carloads	41.85
Ton lots	46.15
Less ton lots	48.65

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.

30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads	22.95
Ton lots	25.25
Less ton lots	26.75

Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	23.05
Ton lots	24.95
Less ton lots	25.95

5M2

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	19.65
Less ton lots	20.90

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload packed	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidex No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point

Marietta, Ashabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	10.25
Johnstown, Pa.	10.25
Sheridan, Pa.	10.25
Philo, Ohio	10.25
S. Duquesne	10.25

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	12.50
Ton lots packed	14.70

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese Silicon

16 to 19%	3% max.	\$89.50
19 to 21%	3% max.	91.50
21 to 23%	3% max.	94.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, Packed	45.75
Ton lots	44.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	30.00
Ton lots	32.00
250 to 1999 lb	34.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn.

	22.35
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Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	32.00	35.55	36.75
0.07% max. C	30.95	33.50	34.70
0.15% max. C	29.45	32.00	33.20
0.30% max. C	27.95	30.50	31.70
0.50% max. C	27.45	30.00	31.20
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	24.45	27.00	28.20

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carload bulk	11.20
Ton lots	12.65
Briquet contract basis carloads, bulk, delivered, per lb of briquet	12.70
Ton lots, packed	14.90

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$98.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$93.00.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96.50% Si, 2% Fe	22.75	21.45
98% Si, 1% Fe	23.25	21.95

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	7.15
Ton lots, packed	9.75

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.

50% Si	12.75	75% Si	15.40
65% Si	14.50	85% Si	17.10
		90% Si	18.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	\$2.05	\$2.95	\$3.75
Less ton lots	2.40	3.30	4.55

Ferrovandium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.

Openhearth	3.10
Crucible	3.20
High speed steel (Primos)	3.30

Alsifer, 20% Al, 40% Si, 40% Fe, Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo.

	\$1.34
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Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	\$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Cb plus Ta.

	\$4.65
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Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.

	\$1.54
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Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton.

10 tons to less carload	\$90.00
	\$110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti.

	\$1.35
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Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti.

	\$1.50
Less ton lots	\$1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton.

	\$177.00
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Ferrotungsten, ¼ x down, packed, per pound contained W, ton lots, f.o.b.

	\$3.30
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Molybdate oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa.

	\$1.33
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Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	17.50¢
Ton lots, packed lump	19.50¢
Less ton lots	20.00¢

Vanadium oxide, 86 - 89% V₂O₅ contract basis, per pound contained V₂O₅.

	\$1.33
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Zirconium contract basis, per lb of alloy.

35-40%, f.o.b. freight allowed, carloads, packed	26.25¢
12-15%, del'd, lump, bulk-carloads	8.50¢

Boron Agents

Borasil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed. B, 3.14%, Si 40-45%, per lb contained 2.

	\$5.25
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Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2% Si 2-4%, Al 1-2%, C 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.

Ton lots per pound	10.00¢
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Ferroboration, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.

	1.20
--	------

F.o.b. Wash., Pa.; 100 lb up

10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa. freight allowed, 100 lb and over

No. 1	\$1.05
No. 79	50¢

Manganese - Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	\$1.40
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots.

	\$2.05
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Silenz, contract basis, delivered.

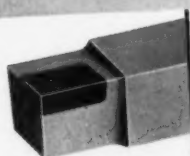
Ton lots	45.00¢
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All Tools May Look Alike—But it's What's INSIDE That Counts

● An extensive, 2-year research program has produced a new series of Talide Metal grades having greatly improved hardness, strength, rupture-resistant and crater-resistant qualities. Users can now get maximum benefits from today's high-speed "automation" machines. Record production runs and continuous machine performance is assured with super-hard, super-tough Talide Tools.

● Universal acceptance of Talide Metal has made possible construction of a new 100,000 sq. ft. multi-million dollar plant at Youngstown, Ohio. Doubled production facilities assure prompt delivery and fast service. All Talide Metal grades are uniform and consistent in quality. They are processed in latest type vacuum electric furnaces under rigid laboratory control. Every test proves Talide is Best!

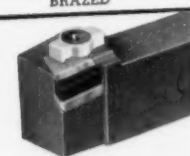
MULTI-PURPOSE TOOLS



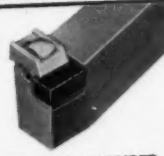
BRAZED



VERTICAL CLAMPED



"THROW-AWAY"



HORIZONTAL CLAMPED

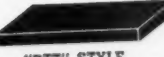
1000, 2000, 3000, 4000,
5000 & 6000 STYLES



"H" & "P" STYLES



"RT" STYLE



"RTT" STYLE



"STB" STRIPS



ROD STOCK

KLAMP-LOK TOOLHOLDER INSERTS



"TR"



"SC"



"SQ"



"DB"

SEND FOR SPEED & FEED CHART—
Pocket-size plastic chart gives complete information on speeds, feeds, relief angles and recommended grades for cutting all metals.



TALIDE TOOLS GIVE TOP PERFORMANCE

40% more forgings cut at Automotive Engine Plant.

Part..... C-1141 steel forging 1-1/2" dia. x 14" long.
Operation..... Turning multiple diameters.
Machine..... New Britain Chucking Lathe.
Tool..... Talide triangular insert #TB-12123, Grade S-88
(Industry Code C-5), mounted in Klamp-Lok
Toolholder.

Depth of Cut..... 1/8" to 3/32" R.P.M..... 1540
S.F.P.M..... 580 Lubrication..... None
Results..... 71 forgings machined per edge per grind compared to 49 machined with best competitive premium grades.

Double Production obtained at Electric Motor Plant.

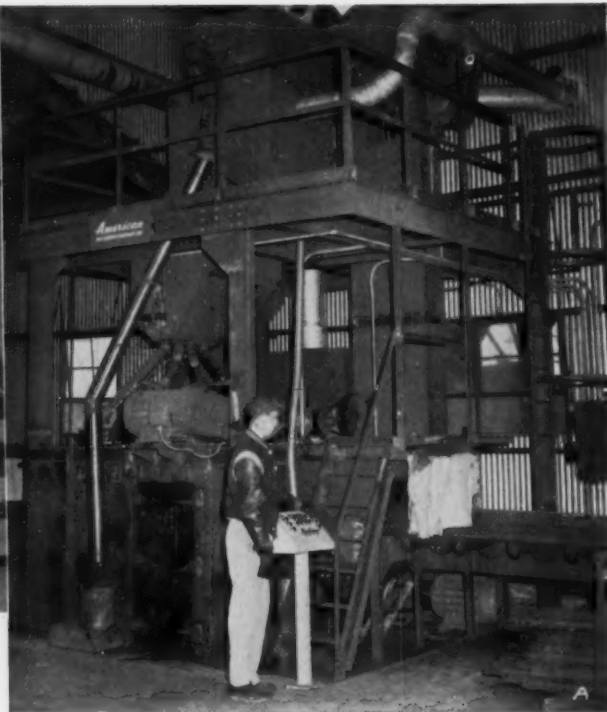
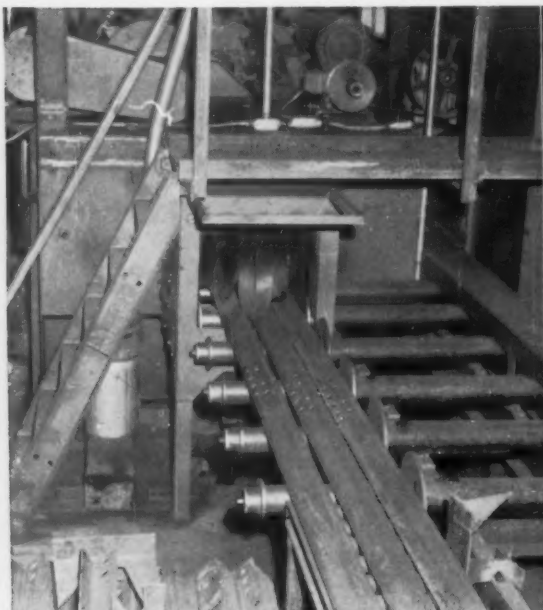
Part..... 1040 steel pump shaft, Brinell 186.
Operation..... Turning 3 diameters and 1 taper.
Machine..... Sundstrand Automatic Lathe.
Tool..... Talide triangular "Throw-Away" insert, 3/8" I.C.
x 1/8" thick, Grade S-92, mounted in Klamp-Lok
Toolholder.

Depth of Cut..... 3/8" Feed..... .021" S.F.P.M..... 300
Results..... 31 shafts machined per edge per grind. Best competitive premium grade produced only 16 before fracturing. Exceptional toughness of Talide grade evidenced by only slight mushrooming of edge—no fracturing.

Call in a Talide sales engineer to recommend proper tooling for your machining operations, or write for 84-page catalog No. 56-G. METAL CARBIDES CORPORATION, 6001 Southern Blvd., Youngstown 12, Ohio.



HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY



*Provincial Engineering
Company, Ltd.*

WHEELABRATES STRUCTURALS Before Galvanizing . . . Saves 7 Ways

Provincial Engineering Co., Ltd., of Niagara Falls, Ont., improved galvanizing operations on structural steel and fabricated members and saved seven ways with Wheelabrator airless blast cleaning. Long structurals such as sections of power transmission and radio towers are cleaned in a straight line production cabinet prior to hot dip galvanizing. Small angles, clip angles and other fabricated pieces which can be tumbled are cleaned in batch lots in a Wheelabrator Tumbblast.

Wheelabrating has cut the preparation cycle from 50 minutes to only 7 minutes, and production has increased 2½ to 3 times. The company for the first time in its history has a steady flow through the plant.

Through the use of Wheelabrator Steel Shot as the abrasive in the Wheelabrators, a steadily decreasing dross loss has resulted compared with that experienced when the steel members were cleaned by pickling.

Rejects now are virtually nil, which has helped to eliminate one acid tank, and its attendant costs and disposal problems. In addition, labor turnover is low now because of improved working conditions. Investigate Wheelabrating today for cleaning of steel in all types of operations.

THE SEVEN SAVINGS

1. Dross loss reduced.
2. Labor turnover ended.
3. Output increased 2½ to 3 times.
4. Rejects virtually eliminated.
5. Cleaning cycle cut from 50 to 7 minutes.
6. Large acid savings effected.
7. Handling and processing labor drastically reduced.

For more details on faster, better cleaning with a Wheelabrator, send today for Bulletin 864.



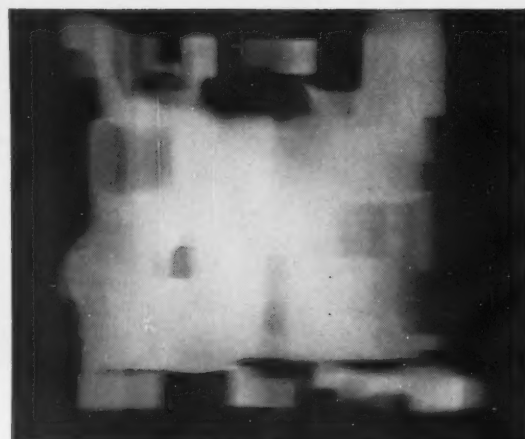
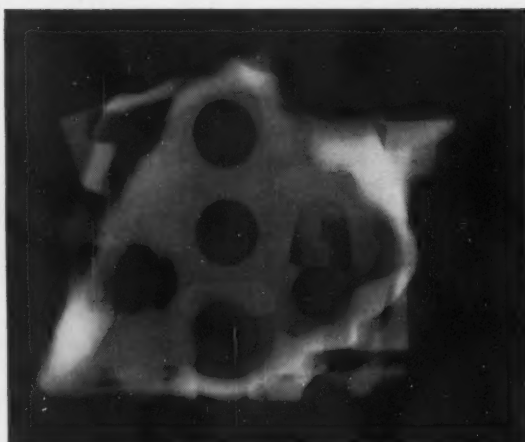
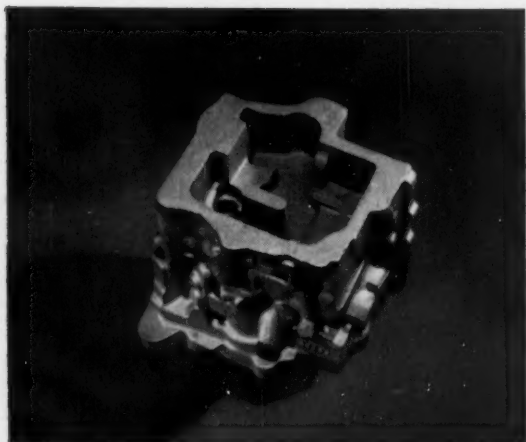
WHEELABRATOR

CORPORATION

(Formerly American Wheelabrator & Equipment Corp.)

*World's Largest Builders of
Airless Blast Equipment*

510 S. Byrkit Street, Mishawaka, Indiana



**Sound
casting yield
jumped from
50% to 96%...**

**when
radiography
pointed
the way**

A jet plane fuel pump called for this intricate casting. The alloy was 355 AMS4214—often prone to gas holes and shrinkage. Rejects from the initial supplier ran as high as 50 per cent.

Then Oberdorfer Foundries undertook to do the job. By studying radiographs made of pilot castings, they developed new methods of gating and position of chills. Sound casting yield rose to 96 per cent. Costs dropped. And an en-

thusiastic customer became a firm friend.

This is typical of the ways radiography can improve foundry operations. It points ways to better castings. It saves countless hours of expensive machining by exposing castings not worth the work.

If you'd like to talk about radiography—discuss how it could help you, get in touch with your x-ray dealer. Or if you like, send for a free copy of our booklet, "Radiography as a Foundry Tool."

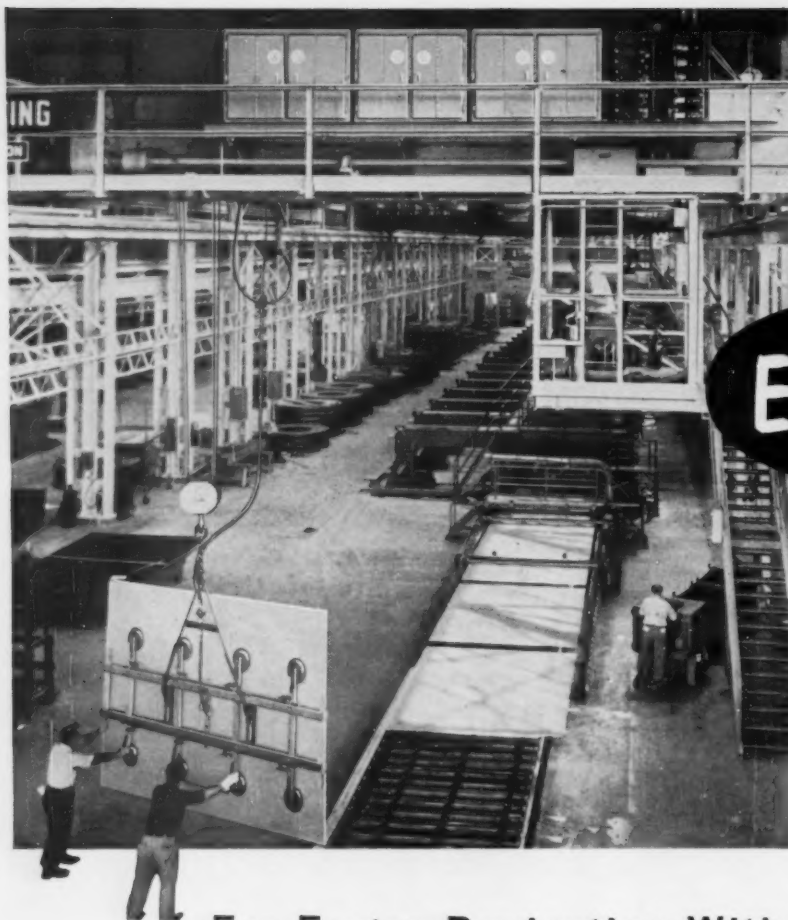
**EASTMAN KODAK
COMPANY**
X-ray Division
Rochester 4, N. Y.

RADIOGRAPHY...

another important example of Photography at Work

January 12, 1956

Kodak
TRADE MARK



Easy does it...

with EC&M
ENGINEERED
CRANE CONTROL

◀ One of several EC&M Controlled cranes which serve the grinding and polishing lines in a glass manufacturing plant. EC&M Control permits slow even speeds... as workmen walk along and guide the load... as glass is gently lowered onto the work tables.

For Faster Production With Greater Safety

Your crane control is developed by EC&M from the crane data sheet. From gearing, rope reeving, motor loading and similar data, EC&M coordinates the control components to give the desired speed regulation that results in smooth performance... right from the start.

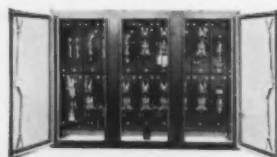
Before buying your next crane, call the nearest EC&M office and ask for a demonstration. They'll be glad to provide you with an opportunity to climb aboard and operate an EC&M controlled crane. Remember... EC&M control equipment assures precise performance for both old and new cranes... and performance is proof.



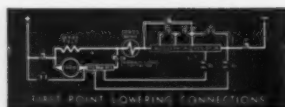
THE ELECTRIC CONTROLLER & MFG. CO.

4498 Lee Road

• Cleveland 28, Ohio



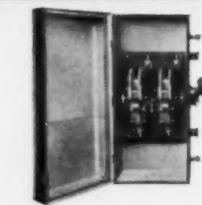
Quick-responding Crane Controller with LINE-ARC Contactors and TIME-CURRENT Acceleration



EC&M simplified Wright Circuit provides safe hoist operation



"WB" Brake provides long life and high speed operation



Manual-Magnetic Disconnect Switch has high interrupting capacity... provides remote control

A Report from the STEEL CENTER of Mid-America



**GRANITE CITY STEEL CO.—WITH TWO ROUNDS OF EXPANSION
COMPLETE—NOW PLANS A THIRD WHICH WILL INCREASE
PRODUCTION FOR MID-AMERICA ANOTHER 30 PERCENT**



*John Marshall,
President, tells
how and why his
company is invest-
ing in the future
of the Midwest
and Southwest.*

"Less than two years ago Granite City Steel completed an \$89 million expansion program.

"Our ingot output has doubled since 1947.

"Now we are starting another major expansion to raise ingot production 30% by early 1958.

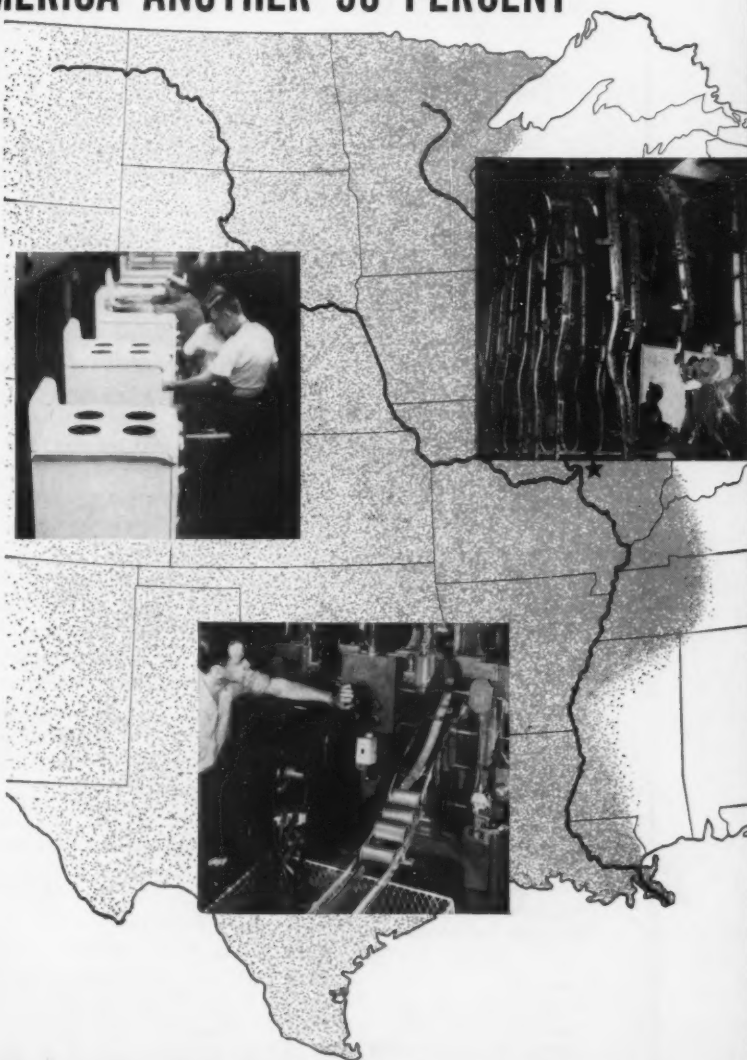
"The first benefits of this new expansion program will come late this year with increased output of hot rolled coils and sheets. Greater production of cold rolled steel will follow later.

"We are, in effect, rounding out our production facilities, to bring open hearth capacity in line with our rolling mill capacity.

"As the major basic producer of sheet steel located on the Mississippi, we believe it is our responsibility to keep pace with the healthy industrial growth of Mid-America—and to build ahead for the future.

"For our economy grows on steel. Its production is one of the measures economists use to determine how we, as a nation, are doing, and where we are likely to go.

"In location, in transportation, in service, we are Mid-America's steel center — and the future of Mid-America looks good to us."



GRANITE CITY STEEL

And subsidiary: Granco Steel Products Co.

RAILWAY EQUIPMENT FOR SALE

Used - As Is - Reconditioned

RAILWAY CARS

All Types

SERVICE-TESTED

FREIGHT CAR REPAIR PARTS

For All Types of Cars

LOCOMOTIVES

Diesel, Steam, Gasoline,
Diesel-Electric

AIR DUMP CARS

(Side Discharge)

Western, Magor and Differential
—50-Cubic Yard, 70-Ton Capacity Drop Door Type, All Steel Construction.

Magor—30-Cubic Yard, 50-Ton Capacity, Lift Door Type.

RAILWAY TANK CARS and STORAGE TANKS

6,000- 8,000- and 10,000-Gallon
Cleaned and Tested

CRANES

Overhead and Locomotive

RAILS

New or Relaying

IRON & STEEL PRODUCTS, Inc.

General Office

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Chicago 33, Illinois
Phone: MIltchell 6-1212

New York Office

50-b Church Street
New York 7, N. Y.
Phone: BEekman 3-8230

**"ANYTHING containing IRON
or STEEL"**

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Ohio Business Better . . . Sales of used machinery in the machine shop class failed to show their normal slow-down in November and December in the Northern Ohio Area, giving the final push to a 60 pct improvement over 1954, according to E. W. Pfeil, president of E. W. Pfeil, Inc., Cleveland. And all available barometers indicate this year should equal last year's pace at least through the first half.

Hottest items in the small machine shop category at present are lathes, drill presses, milling machines, shapers and planers from 12 to 15 years old. These are in heavy current demand at about 50-60 pct of replacement cost of new equipment. Some special pieces will bring up to 75 pct because of fast extending new machine delivery dates.

Still Need Presses . . . Second most sought after equipment handled by Pfeil are presses, press brakes and shears for handling 1/4 in. steel and up. On both these types, incoming orders for November and December held to levels of other months so a fast start this year is already assured. Even during the normally "dead" week between Christmas and New Year, active inquiries turned up by salesmen kept coming in.

Pfeil, Inc., was founded by Mr. Pfeil in 1948 after 35 years with Republic Steel in Cleveland terminating in the Salvage and Reclamation Dept. The firm has 5 salesmen on the road in Northern Ohio plus two in administration and sales at the home office. It also handles several lines of new equipment and this brings in additional trade-ins for re-sale as reconditioned units.

The company operates a warehouse jointly with another dealer in new and used machinery and also specializes in complete hydraulic or pneumatic installations.

Farm Out Rebuilding . . . Rebuilding and reconditioning of units taken in trade or bought is farmed out to several top-notch rebuilders in Cleveland. These have large stocks of replacement parts and personnel with wide experience, insuring a good job.

One of the strongest sales points emphasized by Mr. Pfeil is membership in the Machinery Dealers National Assn. which involves subscription to its 5 point code of ethics. Many customers have stressed that they will buy only from members of this association and most make a point of inquiring whether the dealer belongs.

What's News In Europe? . . . Recent trade fairs in Hanover, West Germany, Vienna, Austria, and Milan, Italy, highlight the generally-accepted fact that such displays have an important effect in both export and domestic machine tool sales. All told, their importance is probably more noticeable at this time than even a year ago.

Right now, manufacturers are driving hard to boost exports, are, in some cases, guaranteeing delivery fob ports in 3 to 4 weeks from receipt of order. In many cases, a domestic buyer would have to wait around 13 to 14 weeks for delivery.

Export customers, say western European manufacturers, aren't showing too keen interest in new gadgets. Rather, they're inclined toward buying proved models of older, standard-line equipment, reasonably priced. The buying trend, at the moment, centers on light tools, with heavier items finding few customers since early last summer.

Best in demand are light presses up to 100 tons, small shapers, and grinding machines not over 40 in. Punch and shear combinations are also moving very well.

THE CLEARING HOUSE

CONSIDER GOOD USED EQUIPMENT FIRST

ANGLE BENDING ROLLS

1 1/2" x 1 1/2" x 1/2" Niagara No. 3
#123P-66 Logemann, Charging Box 66x18x24. Produces Hale 125 to 150 lbs.
#125-TC Galland Henning, Volume of Box 145 cu. ft. Bale size 500 to 800 lbs.

BENDING ROLLS

8"x16" Bertach Initial Type
16" x 1 1/2" Bertach Initial Type
12" x 1 1/2" Niles Pyramid Type
16" x 1 1/2" Bertach Initial Type Bending Roll
18" x 1 1/2" Wickes Pyramid Type
20" x 1 1/2" Hillis & Jones Pyramid Type

BRACKS—LEAF TYPE

12" x 1 1/2" Drels & Krump
12" x 1 1/2" Drels & Krump, Motor Driven
#125—PRESS TYPE
12" All Steel Press Brake, 250 ton Capacity
12" x 5/16" Pacific Hydraulic, 300 ton

BROACH

Model VP-4-40-40 American Vertical Hydr. Broach. Max. Capacity 60 ton, Stroke 40". Motor Drive

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H 23' Span 230 Volt D.C.
5 ton Northern 50' Span 230 Volt D.C.
5 ton Cleveland 96' Span 230 Volt D.C.
7 1/2 ton P&H 85' Span 440/2/60 A.C.
10 ton P&H 58' Span 230 Volt D.C.
10 ton Milwaukee 80' Span 230 Volt D.C.
With 5 ton Auxiliary
10 ton P&H 96' Span 230 Volt D.C.
15 ton P&H 54' Span 230 Volt D.C.
20 ton P&H 40' Span 230 Volt D.C.
20 ton Toledo 75' Span 550/2/60 A.C.
30 ton Alliance 50' Span 230 Volt D.C.
With 10 ton Auxiliary
120 ton Whiting 80' Span 230/3/60 A.C.
With 10 ton Auxiliary

FORGING MACHINES

1" to 5" Acme, Ajax, National
1", 4", 5", National High Duty, Air Clutch

FURNACES

Lee Wilson Natural Gas Annealing Furnace. Work Dimensions 42" coil, 90" Piling Height
Ther-Monic Induction Heater Model 1400
2 ton Swindell Dressler, Top Charge
6 ton Heroult Top Charge, with Transformer
15 ton Heroult Top Charge, with Transformer

HAMMERS—BOARD DROP—STEAM DROP

STEAM FORGING—600 lb. to 20,000 lb.

LEVELERS—ROLLER

52" McKay 17 Rolls 3 1/2" Dia.
72" McKay 15 Rolls 4 1/2" Dia.

PRESSES—HYDRAULIC

150 ton HPM Double Acting, 36" Max Ram Travel
Holster 36" x 36"
300 ton United Steam Hydr. Forging Press
530 ton Baldwin Southwark 12" Stroke 48" x 25" Between Columns
800 ton Clearing 48" Stroke, Bed Area 48" x 48"
1000 ton Lake Erie Double Acting 46" Stroke, Bed Area 72" x 146"
1257 ton Baldwin Southwark Forging Press, 30" Stroke Main Ram, 54" x 41" Bet. Columns
2045 ton Birdabore, 4 Columns, 14" Stroke Platen 42" x 40" Daylite 47"
4500 ton B-L-H Hydr. Forging Press

PRESS—Straight Side

Clearing Model TF41500-200 Triple Acting. Strokes 40, 32, 14", Bed Area 100" x 200"
Version 81-10 Mech. Eccentric Type Single Point
Suspension Press, 200 ton, 30" Stroke
Bliss #20E Double Crank, 500 ton, 16" Stroke, Bed Area 51" x 120"

PUNCH & SHEAR COMBINATIONS

2 1/2 Buffalo Universal Ironworker, with Notcher
2 1/2 Buffalo Universal Ironworker
Style EF Cleveland 36" Throat, Punch 1 1/2" thru 1"
Style W Cleveland Single End, 60" Throat, 312 Ton
ROLL—PLATE STRAIGHTENING
10" Hillis & Jones, Six Rolls 14" Dia.

ROLLING MILLS

15" x 24" Garrison Single Stand Two High
16" x 24" United Single Stand Two High
20" x 26" Hoagland Single Stand Two High
22" x 40" Lewis Three High

ROLLS—FORMING

8 Stand Rafter Tube Forming Machine, Spindle 1 1/2"
3 Stand Billet Roll Forming Machine, Shaft 2 1/2"

SHEAR—GATE

80" x 3/4" Pels
6 x 6 x 1 1/2" Long & Allstat Size B

SHEAR—ANGLE

2 1/2 H&J Gullotine, Capacity 3 1/2" Square, 4" Round

SHEARS—ROTARY

1 1/2" Killing #250, With Flanging Attachment
1 1/2" Quickwork Whiting #94A—NEW 1953

SHEARS—SQUARING

10" x 12 Ga. Niagara No. 501B
12" x 3/16" Cincinnati #1412
12" x 3/4" Loy & Nawrath

SLITTERS

38" Faxon Coil & Sheet Slitter
G-48 Yoder Gang Slitter, 5" Threaded Arbor
3-30 Yoder Slitter, 7" Plain Arbor

STRAIGHTENERS

3/4" Hunter Straightener & Cut-off, 14" Cut-off
Taylor Wilson Cross Roll. Cap. 1/4" to 1 1/2" Bars

TESTING MACHINES

5,000, 10,000, 100,000, 200,000# Olsen & Riehle Universal; 50,000 & 300,000# Compression

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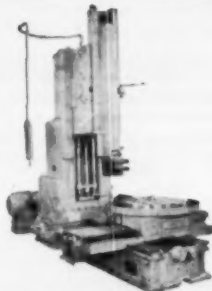
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36" Rockford Hydraulic Vertical Slotter, serial No. 64-SL-23, new 1944. Stroke 36", table 43", 20 HP main drive motor. Rebuilt and guaranteed equal to new.

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Model 1020, self-propelled. Capacity 10 to 15-ton, 40' boom. Mounted on 12 pneumatic tired carrier, hydraulic steering, air brakes. Excellent condition.

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Thoroughly
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Model CB Bath contour former, capacity 25 Ton at 36", 12 1/2 Ton at 72", serial No. CB4334, new in 1943. Rebuilt and guaranteed at approximately 1/2 new price.

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REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

DIRECT CURRENT MOTORS

Qu.	H.P.	Make	Type	Volts	R.P.M.
2	2000	Whas.	Mill	525	400
6	1500	Whas.	Mill	525	600
1	1250	G.E.	MCP	600	250/750
4	800	Whas.	240L	350	600
4	750	Whas.	Mill	450	360/700
2	600	Al. Ch.	Mill	440	300/600
2	500	Whas.	Mill	250	285/710
1	450/230	Al. Ch.	Mill	375/350	450/1800
1	450	Whas.	SK	320	450/600
1	350	G.E.	CD-140	230	1150
1	260/250	Ed. Dy.	Ped. Brg.	230	400/1200
1	280	Whas.	SK-210	230	400/680
1	180	G.E.	MPC	230	400
1	150	Whas.	SK-201	230	300/900
2	125	Whas.	SK-184	230	575/850
1	125	G.E.	MPC	230	400/680
1	100	Ed. Dy.	SK-8	230	450/1350
2	100	Ed. Dy.	SK-8	230	475/950
1	80	Reliance	601-T	230	575/1150
1	50	Whas.	SK-181.5	230	600/2200
1	40	G.E.	CD-123	230	500/1000
1	40	Whas.	SK-140	230	500/1700
1	32 1/2	Whas.	SK-150	230	460/1200
1	25	Whas.	SK-95	230	1100
1	20	Cr. Wh.	D. P. R. B.	230	1150/2400
1	20	Whas.	SK-123	230	400/1200
1	15	G.E.	CD-85	230	875/2200
1	15	Whas.	SK-100L	230	500/1500
1	12	Reliance	155-T	230	400/1600
1	10	Whas.	SK-103	230	400/1600
1	10	Al. Ch.	E-123	230	300/1200
4	10	Whas.	SK-91	230	250/1000
1	7 1/2	G.E.	CD-75	230	690/2070
1	7 1/2	G.E.	CD-85	230	460/1350
4	5 1/2	Reliance	T.E.F.C.	230	887/1350

MOTOR GENERATOR SETS

Qu.	KW	Make	R.P.M.	D.C. Volts	A.C. Volts
1	3500	Whas.	720	600	4100/2300
2	1250	Whas.	720	600	2300
1	500	Cr. Wh.	720	600	2300/440
2	500	Whas.	1200	125/350	2300/440
1	400	Cr. Wh.	1200	125/350	2300/440
1	300	G. E.	1200	125	2300
1	300	G. E.	900	125/350	2300
1	150	G. E.	1200	250	2300
1	100	Whas.	900	250	2300
1	100	Cr. Wh.	1200	125	440/230
1	75	G. E.	1200	250	440/230
2	50	G. E.	1200	250	440/230

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"Macsteel" Philadelphia, Pa.

Phone

Davenport 4-8300

No. 00G B & S Automatics, H.S.
Van Norman No. 35 Plain Mills.

Van Norman No. 25U Mills.
Bliss No. 23 Coining Press, 1944.

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ROLLING MILLS—STEEL WORKS EQUIPMENT

1—34" & 22" x 112" 3-HIGH PLATE MILL with front and back tilting tables, 1500 HP motor and gear set; also 84" 3-high jump mill on same drive, with tables.
1—30" x 97" BLOOMING OR SLAB MILL, 2-HIGH, reversing.
3—4-HIGH HOT STRIP MILL STANDS for up to 76" width.
1—16" x 24" STRIP MILL, 2-HIGH.
1—20" x 20" 2-HIGH COLD MILL, with motor drive.
1—12" x 12" 2-HIGH COLD MILL, roller bearings.
1—10" x 16" 2-HIGH TANDEM COLD MILL, 3 stands, with D.C. Drives.
1—5" x 8" 2-HIGH COLD MILL.
1—24" BAR MILL, 3-HIGH, 3 stands, with variable speed, D.C. motor, traveling tilting tables, roller tables, saws, bloom shear, furnaces.
1—18" x 40" 3-HIGH BREAKDOWN MILL, 1 roll stand, pinion stand, 500 H.P. motor and controls.
1—9" BAR MILL, 3-HIGH, 4 stands: 2 spare stands.
4—10" BAR MILL STANDS, 2-HIGH, with 400 H.P. motor and controls.
1—4-HIGH SINGLE STAND COLD MILL for strip up to 14" wide.
2—UNITED ALLIGATOR SHEARS, 4" square and 2 1/4" square.
1—34" x 192" ROLL GRINDER with motors and controls.

1—44" ROLL LATHE, enclosed headstock, tailstock, piano rest, 20 H.P. 500/1500 RPM, 230 volts D.C. motor and controls.
2—PACK FURNACES for hot sheet mills, 42" x 40", double chamber.
1—STAMCO #4 CORRUGATING MACHINE for sheets, removable dies.
1—AJAX electric induction melting furnaces, 2000 lbs. each.
1—TON HERCULET electric melting furnace, top charge.
1—UNITED #4 vertical open-side bar shear.
1—PLATE SHEAR, capacity 1" x 14".
2—DRAWBENCHES, 50,000 lb. and 20,000 lb. capacities.
1—COKE OVEN PUSHER, used very little, excellent condition.
1—BONNOT-LENTZ BILLETEER, Size "A", maximum capacity 9" x 9".
1—125-TON LADLE CRANE 25-ton auxiliary, 50' span.
1—100 TON CRANE, 40' span, 25 ton auxiliary.
1—500 HP MOTOR, 120 RPM, 2200/3/60 with control.
1—400 HP MOTOR, 327 RPM, 2200/3/60 with control.
1—1800 HP GEAR DRIVE, ratio 19 to 1.
1—500 HP GEAR DRIVE, ratio 7.63 to 1.
1—SCRAP BALER, box size 84" x 18" x 36".
4—TINNING UNITS for hot dipped tin plate.
1—PICKLING MACHINE for sheets, Taylor design.

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RE-NU-BILT GUARANTEED ELECTRIC POWER EQUIPMENT

D. C. MOTORS

Qn.	H.P.	Make	Type	Volts	RPM
1	3000	Wbas.	Tandem	550	600
1	2200	G.E.	MCF	600	400/500
2	1500	Wbas.	Rev.	600	600
1	1400	G.E.	MCF	600	63/190
1	1200	G.E.	MCF	600	750/950
1	1000	G.E.	MCF	600	350/700
1	940	Wbas.	QM	250	140/170
1	880	Wbas.		350	450/550
1	600	A.L. Co.		250	400/800
1	500	Wbas.	CC-316	600	300/800
1	450	Wbas.		550	415
1	250	Wbas.		250	325/650
1	250	G.E.	MPC	230	400/600
1	200	G.E.	CD-1660Z	230	500/1500
1	200	Wbas.	OB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	60H	230	1150
1	150	Cr. Wh.	80H-TIEPC	230	890
1	150	Wbas.	RE-151B	230	900/1800
1	150	Wbas.	RE-201	230	360/950
1	120	G.E.	MCF	230	250/1800
1	125	Wbas.	RE-141	230	500/1500
1	125	Wbas.	RE-183	230	850
1	100	Rel.	1050T	230	400/1300
2	100	Wbas.	RE-181	230	450/1000

M-G Sets—3 Ph. 60 Cy.

Qn.	K.W.	Make	RPM	D.C. Volts	A.C. Volts
2	2000/3400	G.E.	450	350/300	3200/4600
1	1750/2100	G.E.	514	350/300	2300/4600
1	2000	G.E.	540	250	1100
1	2000	G.E.	514	600	600/13200
1	1500	G.E.	720	600	6000/13200
1	1000	G.E.	720	600	2300/4600
2	750	G.E.	750	575	2300/4600
1	750	Wbas.	800	250	2300/4600
1	600	G.E.	730	350	440/2300
1	300	Wbas.	1200	250	200/440/550

TRANSFORMERS

Qn.	KVA	Make	Type	Ph.	Voltages
1	3000	Wagner	HPW-20	3	96400x2400
3	1000	G.E.	HVDDJ	1	2400x400
6	1000	Wagner	DIBC	1	13200x400
3	667	G.E.	ED	1	13800x2300
3	550	Kuhl.	DIBC	1	2300x230/400
3	333	G.E.	ED	1	13200x2300
3	333	G.E.	ED	1	2300/4000x230/400
3	250	Penn.	DIBC	1	24500x120/240

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6' arm 19" col. CARLTON RADIAL DRILL.
48 Spindle Speeds 10 to 1000 RPM.
20 HP. A.C. Motor Drive. New in 1943.
Inspection under power.

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INGERSOLL-RAND AIR COMPRESSOR

175 HP—Type XRE 220/3/60 2 Stage 14 x 12—
6 x 12 638 C.F. P.M.—470 C.F. Free Air P.M.
Max. Del. 450# P.S.I. Intercooler—Aftercooler
Control Panel—Reasonably Priced.

SEABOARD STEEL CO., New Haven, Conn.

1—10 ton Wright Crane Trolley, wheel span 6'9", rated hoist speed 27 FPM, rated trolley speed 150 FPM.

1—10 ton Side Charge Electric Melting Furnace, with 2100 KVA, 13200 volt, 3 phase, 60 cycle, with controls.

1—15 ton Crane, P & H, 79' span, 35' lift, 230 volt DC, cab operated, fish belly girders; with 400' outdoor runway, 35' high.

2—5 ton Shaw-Box Trolleys, 230 volt DC, 6'0" gauge, 35' lift, 2 motor.

Lou F. Kinderman
Box 182 - Niles, Ohio • Phone OL 2-9876

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BLISS #76 1/2-72 Double Crank Press 600 Ton Cap., Bed 72" x 55"

BLISS-TOLEDO #75C Double Crank Press 250 Ton Cap., Bed 40" x 40"

Both have Air Clutch, Air Cushion, Air Counter Balance & are Still Set Up in Operation

CLEARING #K-1200-30 Knuckle Joint 200 Ton Cap., 4" Stroke Air Clutch

TOLEDO #63A Knuckle Joint 400 Ton Cap., 9 1/2" Stroke Air Clutch

"If it's machinery we have it."

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2—36" x 240" CINCINNATI

Traveling Wheelhead

Filmatic Bearing—Hydraulic Feed

Crowning Attachment—Motors—Controls

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1—65 ton Diesel Elec. Locomotive
1—50 ton Diesel Elec. Locomotive
1—35 ton Diesel Elec. Locomotive
1—25 ton Diesel Locomotive Crane
1—35 ton Diesel Locomotive Crane
1—10 ton Crane Kar
1—3500 Manitowoc Crane
2—20 and 25 ton Truck Cranes

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ELECTRICAL EQUIPMENT
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American Wheelabrator Tumbblast 36"x42".
American 48" Swing Table.
American Wheelabrator Cabinet No. 1A with 7-14" Tables.
Pangborn 4' Rotary Turn Table Suction Sand Blasting Cabinets, Direct Pressure Sand Blasting Tanks, Burring Booths, Preheating Ovens, Gehrich & Gehrich Uniwash, Dust Collectors, American Rotoclone Sludge Dust Collectors, Dry Dust Collectors, 250 CFM to 17,000 CFM.
Brinell Hardness Testers, Gagan 4500 K9 Motorized, Tinius Olsen Brinell Hardness Tester Motorized 4000 lbs.
Detroit Hardness Tester Model HB2 Portable Tensile Testing Machine 2000 lbs. Vacu Blasters.

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THE CLEARING HOUSE

Eastern Rebuilt Machine Tools THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

ENGINE LATHES

24" Schumacher & Boye Loose Change, raised to swing 33" x 24" bed, cone, motorized
24"x12" LeBlond Geared Head, m.d. taper
24"x12" bed Boye & Emmes belt drive
24" raised to swing 32"x22" bed—16" centers
New Haven, cone, taper
25"x10" bed LeBlond Geared Head, m.d., taper
30" raised to swing 44"x15" bed American Geared Head, m.d.
30"x12" bed Niles-Bement-Pond variable speed, m.d., taper
30"x10" bed American High Duty Geared Head, m.d., taper
36"x84" centers American "Super-Productive," m.d.
36"x18" centers Lodge & Shipley Geared Head, m.d.
36"x18" bed Putnam Geared Head, m.d.
38"x17" centers American Super-Productive Geared Head, m.d.
40" raised to 40"x108" centers LeBlond, m.d.
42" Monarch NN Geared Head, m.d., late
42"x14" bed American Geared Head, m.d.
42" Putnam raised to swing 56"x20" bed Geared Head, m.d., 11" centers
42"x46" centers, 54" bed, American Geared Head, m.d.

48"x33" centers Niles-Bement-Pond, m.d.
63"x27" centers I. H. Johnson, m.d.
60" raised to swing 90" over bed x 68" centers Niles-Bement-Pond, m.d.

MANUFACTURING LATHES

12x33", 20x25" Jones & Lamson Fay Automatic Lathes, 1944
12x18" Reid Small Piece Production Lathe, Model 6WSL, m.d.
No. 3 Lodge & Shipley Duomatic, m.d., late type
No. 3A Lodge & Shipley Duomatic, m.d., late type
No. 3 Niles-Bement-Pond Axle Lathe, m.d.
W. C. Lipe Carbo-Semi-Automatic, m.d., late
No. 4 LeBlond Boring Lathe, 37" bed, 4" hole, m.d., latest
No. 9, 12 LeBlond Multi-Cut, m.d.
4x60" LoSwing, m.d.
8x132" LoSwing, m.d., latest
9x12" Sundstrand, s.p.d.
11x18" LeBlond Rapid Production, m.d.
12x18" centers Monarch Model 5T, m.d.
No. 12 Gisholt Semi-Special Automatic Production, m.d.
No. 9WSL, 18x22" Reid Production Lathe

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.

THE EASTERN MACHINERY COMPANY

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4" National Upsetter High Duty, guided over-arm slide, air clutch
Ajax & National Upsetters, suspended slide, 1", 1 1/2", 2", 3", 4"; similar upsetters not suspended slides
700-ton Ajax High Speed Forging Press
500-ton National Maxipres
Kling No. 6 Bar & Billet Shear, 6" rd.
Hilles & Jones and Buffalo Shears 1 1/2", 2", 2 1/2", 3", 3 1/4", 4" and 4 1/4"
1600 & 2500# Chambersburg Model F Board Drop Hammers, Roller bearing; double V-ways. Built 1943
1500# Niles & 2500# Chambersburg Single Leg Steam Forging Hammers
4000# Niles Bement Double Frame Steam Forg. Hammer
Bradley Hammers, all sizes, including 500# Upright
Nazel Air Forging Hammers, #2-B, 4-B, 5-N
Williams White Bulldozers, #22, #3, #4, #25, #6, #29 U-type
300-ton Oilgear High Speed Hydraulic Press, Ram 27" x 23"
Landis Landmaco and other Landis Threading Machines from 3/8" to 4"
Single and Double End Punches
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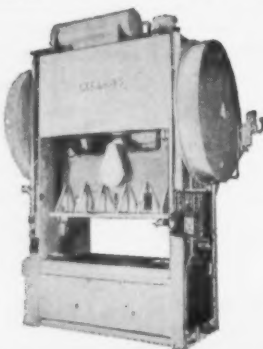
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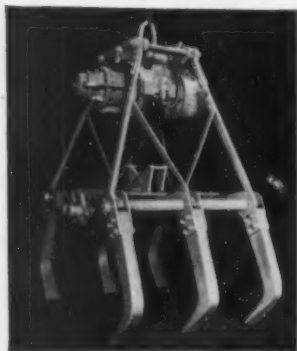
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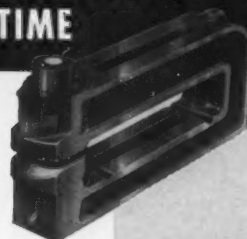
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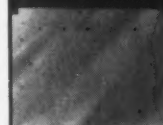
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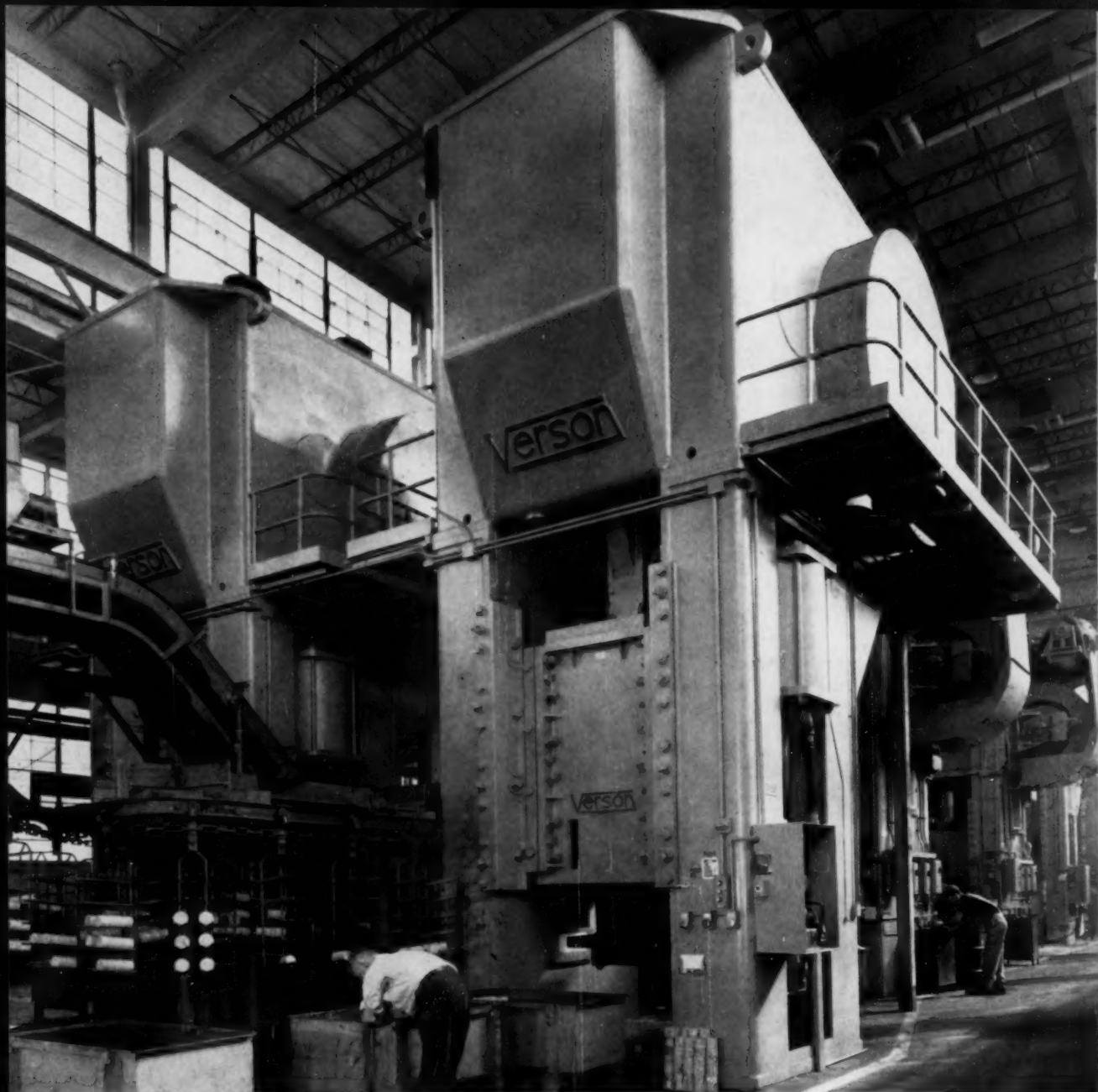
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